PRIME

FIELD ENGINEERING SERVICE MANUAL #140

FIELD ENGINEERING SERVICE MANUAL

140

FOR

NEC SPINWRITER

INDEX OF SERVICE MANUALS

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JUNE 1981

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Manual No. 140

Assigned to [redacted]

PRIME Computer, Inc.

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UPDATE RECORD

It is emphasized that this manual will only be of value to the user if kept current. Delays in updating the manual may result in the use of procedures that do not match the latest hardware configuration. To avoid such situations the following maintenance shall be observed.

When new and/or revised pages are received with the cover memo, which consists of an update number, a list of affected pages, and a brief explanation of the new material, the update record below should be completed. Material should be reviewed and the replacement pages immediately filed in the manual. If the update numbers are not consecutive, the home office should be contacted for the missing edition(s).

UPDATE NUMBER	INSERTION DATE	INITIALS	UPDATE NUMBER	INSERTION DATE	INITIALS

CHANGES AND CORRECTIONS

This manual is written for and by Field Engineers. Please forward corrections and suggestions for improvements to PRIME COMPUTER INC., 6 Strathmore Rd., Natick, Mass. 01760, ATTN. Field Engineering, Planning and Development.

ACKNOWLEDGEMENT

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FOREWORD

PRIME COMPUTER INC. is committed to a policy of providing the best possible service for our products and our customers. This manual has been prepared by Field Engineering for use by Field Engineers. It is intended to be used as a training aid and as a guide for Installation, Preventive and Corrective Maintenance.

The Manual is organized into chapters based on tasks the Field Engineer will perform at the customers' site. Tasks that are too difficult and time consuming to be performed on the customers' site are beyond the scope of the handbook.

Through experience and necessity Field Engineers continually find methods to simplify procedures and tasks relating to Installation and Maintenance. With the understanding that the best manuals are an organized collection of these Field proven shortcuts, you are encouraged to forward all such procedures to Field Engineering, Planning and Development.

Although this manual contains information on all Installation and Maintenance tasks, the key to providing the best possible service is through the faithful and continuing performance of Preventive Maintenance. Preventive Maintenance is aimed at keeping each and every installation operating at peak performance. By exercising and tuning systems on a regular basis during planned periods in the customers' schedule, failures that might otherwise occur and cause a loss of operation may be detected and corrected during PM.

Use of WARNING, CAUTION and NOTE is as follows:

WARNING - To warn the operator of a potentially hazardous condition that may cause physical injury.

CAUTION - To caution the operator of a condition that could cause damage to the equipment.

NOTE - To provide additional information.

LIST OF EFFECTIVE PAGES

NOTE: The current software revision in effect at the time of publication of this manual is rev 17.2. As revisions are issued, this list of effective pages will be updated to indicate the pages revised and the date of the revision issue. The portion of text affected by the revision is indicated by a vertical line in the margin of the page.

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CHAPTER 1
GENERAL DESCRIPTION

INTRODUCTION

The Spinwriter is a micro-processor controlled serial impact printer which prints fully formed characters bi-directionally under user control at a rate of up to 55 characters per second. It is designed for applications in which impeccable print quality and multiple copy capability are required.

NEC MODEL NUMBERS

The original models of the SPINWRITER were modified versions of NEC Model 5510. The model number of the SPINWRITER that PRIME is presently using is NEC Model 5515. The main difference between these two model numbers is the Processor Board that is being used. The Model 5515 uses a G9DWH Processor Board. The model and serial number can be found by viewing the SPINWRITER from the top and looking on the right side between the Carriage Rails.

PRIME TYPE NUMBERS

MODEL NO.	PART NO.	DESCRIPTION
3175	LPR4241-001	Letter Quality Printer 55cps w/ Forms Tractor 60 Hertz
3175-A	LPR4241-901	50 Hertz version
3176	KIT4248-002	Cut-Sheet Feeder Option
3177	KIT4248-003	Printer Stand

SPECIFICATIONS

PERFORMANCE	
Print Speed	55 characters per second at 12 characters per inch bi-directional
Baud Rates Available	10 cps @ 110 baud 15 cps @ 150 baud 20 cps @ 200 baud 30 cps @ 300 baud 55 cps @ 600 baud 55 cps @ 1200 baud
Character Set	128 characters maximum
Print Line	136 columns at 10 characters / in. 163 columns at 12 characters / in.
Paper Width	16 in.
Paper Thickness	0.027 in.
Carriage Return Time	400 ms
Horizontal Resolution	120 positions / in.
Vertical Resolution	48 postions / in.
Line Feed Speed	40 ms per 1/16 in. (plus 53 ms settling)
Spacing Speed	16 ms @ 12 chars / in.
Tabbing	Horizontal and vertical in any direction
Copy Thickness Control	5-step switching (set by operator)
Impression Control	3 levels (operator set)
Form Feed	1 to 99 lines
SIZE	
Overall Dimensions	Width: 24.8 in. Height: 8.68 in. Depth: 16.3 in.
Weight	45.5 lbs including covers and power supply
POWER	
Power Requirements	115 Vac, ±15% 50/60 Hz @3.5 amps or 230 Vac, ±15%, @2 amps. The SPINWRITER consumes approx. 170 watts.
ENVIRONMENTAL	
Temperature	Operating: 68 F (20 C) to 78 F (26 C) Storage: -4 F (-20 C) to 158 F (70 C)
Humidity	Operating: 10% to 85% (No condensation) Storage: 10% to 95% (No condensation)
Altitude	Operating: Sea Level to 10,000 ft. Storage: Sea Level to 25,000 ft.
Acoustic Noise	67 dBA (w/o Covers) 60 dBA (with covers)

OPERATOR CONTROL PANEL

The operator control panel has an error RESET switch and control switches for Form Feed (FF), Set Top of Form (SET TOF), and POWER. In addition to these switches, the indicator for error (ALARM) and POWER, and audible alarm buzzer are installed on the panel. The panel also provides switches for selection of data rate (SPEED), parity (PARITY), half/full duplex (DUP), local, line feed (LF), spacing (SP), CLEAR, FORM LENGTH and TEST.

SUPPLIES

PRINT RIBBONS

Print ribbons are contained in an easily replaceable ribbon cartridge. Single-color and two-color nylon ribbons are available as well as a multi-strike film ribbon. The vendor supplies the following ribbons:

1. Single Color Ribbon (Black). This ribbon is made of nylon cloth. The ribbon is arranged in a continuous loop and can be used repeatedly. Life of this ribbon is approximately 1.5 million impressions.

2. Two-Color Ribbon (Red/Black). The two-color ribbon is also made of nylon cloth and arranged in a continuous loop. Life of this ribbon is approximately 1.5 million impressions.

3. Multi-Strike Film Ribbon. The multi-strike film ribbon is used when extremely sharp characters are required. As this ribbon is NOT of continuous loop construction, it must be replaced after one pass. A ribbon end sensor detects the end of ribbon and stops SPINWRITER operation. Life of the multi-strike ribbon is approximately 230,000 impressions.

PRINT THIMBLE

The print thimble is a low cost, low mass, long life, fiberglass reinforced print element with 64 individual, spring action fingers cylindrically arranged and molded. A maximum of two characters may be mounted on each finger, giving a total of 128 characters.

PART NUMBERS

NOTE

THESE PART NUMBERS ARE PROVIDED FOR FIELD ENGINEERING USE ONLY. THEY ARE NOT TO BE USED TO ORDER SUPPLIES FOR THE CUSTOMER.

Thimbles

PRANEC803-020004-212 Courier 12

Ribbons

PRANEC803-020006-010 Red/Black Nylon
PRANEC803-020006-011 Black Nylon
PRANEC803-020025-021 Black Multistrike

OPTIONS

PRIME offers two options with the printer, a cut-sheet feeder and a stand.

PRINTER STAND GENERAL DESCRIPTION

The printer stand is available with forms receiving tray for stacking printed outputs. The stand is designed for rear or bottom paper feed.

CUT-SHEET FEEDER GENERAL DESCRIPTION

The cut-sheet feeder is an optional forms handling device for the SPINWRITER. The unit allows automatic inserting and stacking of cut-sheets. The cut-sheet feeder features a 200 sheet capacity, as well as paper out and paper jam detection. The unit can accomodate paper widths from 5.5 to 12 inches and paper lengths from 3.6 to 14 inches.

RELATED DOCUMENTS

The following documents are provided on micro-fiche.

SPINWRITER Maintenance Manual

SPINWRITER Terminals Operator's Guide

SPINWRITER Terminals Product Description

SPINWRITER Cut-Sheet Feeder Maint. Manual

CHAPTER 2
INSTALLATION

INTRODUCTION

This procedure may be used to install the first SPINWRITER on a system or to add an additional one.

1. The packaged unit should be examined for possible shipping damage. If any damage is apparent, the following procedure must be followed:

   A) DO NOT perform any repair or installation of the damaged equipment until an insurance claim inspection has been completed.

   B) Retain all packing material.

   C) Have delivering carrier's agent inspect damage. Forward copy of damage report to Manager Field Engineering, Material Control, Natick.

   D) Notify Field Engineering, Material Control, Natick, that damage has occurred. Provide description of damage and what is necessary to correct damage. F.E. Material Control will arrange for inspection by PRIME'S insurance carrier and initiate activity to obtain materials necessary to correct damage.

   NOTE

   Inspection by PRIME'S insurance company should occur within two (2) days of notification of F.E. Material Control.

2. It is the customer's responsibility to have the printer moved into its position in the computer room.

UNPACKING/REPACKING INSTRUCTIONS

To unpack the SPINWRITER use the following procedures.

NOTE

Failure to adhere to the following instructions could result in voiding the warranty.

1. Recommended tools - one adjustable wrench.
2. Unpacking instructions:

   A) Remove SPINWRITER from the shipping carton (Figure 2-1) and place on table capable of supporting at least 60 lbs.

   B) Remove the PVC bag, and using the packing material as a cushion, tilt the SPINWRITER on its back to expose base (Figure 2-2). Raise top cover.

   C) Use an adjustable wrench to remove the three (3) bolts, which secure the base plate to the printer assembly.

   D) Place SPINWRITER on it base and retain the top cover in the open position.

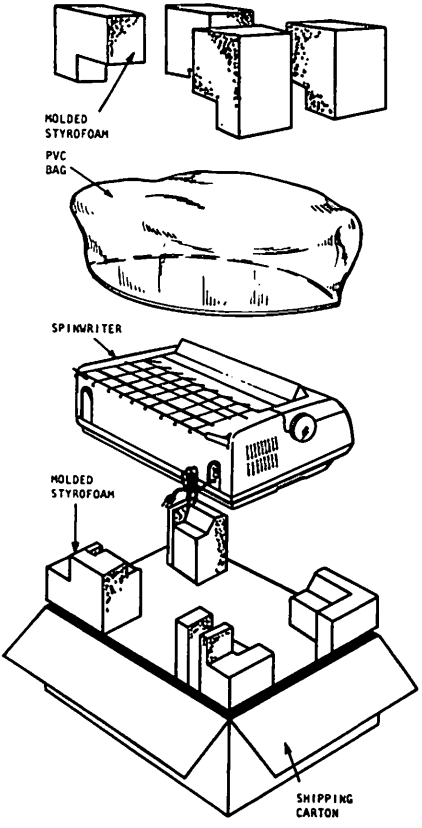

FIGURE 2-1: UNPACKING DIAGRAM

E) Remove red print carriage retaining ring (Figure 2-3) and close top cover.

3. To repack, reverse unpacking instructions.

CAUTION

When repacking, do not place bolt in right rear hole (see Figure 2-2), as damage to printed circuit boards (PCBs) could occur during shipment.

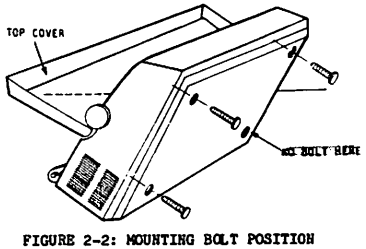

FIGURE 2-2: MOUNTING BOLT POSITION

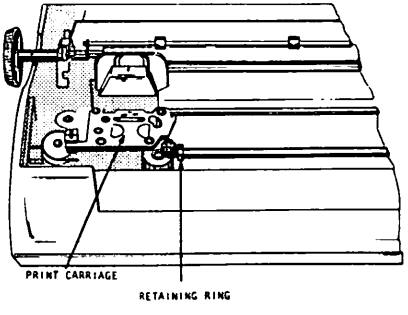

FIGURE 2-3: RETAINING RING POSITION

INSTALLATION PROCEDURES

VISUAL INSPECTION

1. Ensure that the print carriage retaining ring is removed (Figure 2-3).

2. Visually inspect the printer mechanism for any damage.

3. Remove the top cover (refer to Chapter 6 for removal procedure).

4. Ensure that all printed boards are properly seated and printed circuit circuit cables are connected.

5. Inspect for any loose hardware or extraneous parts or materials.

6. Replace top cover.

CABLING

1. Connect the AC power cord to an AC source. Avoid lines that are connected to devices that are connected to large amounts of electrical noise.

WARNING

DO NOT USE TWO-PRONG ADAPTORS OR TWO WIRE EXTENSION CORDS.

2. The SPINWRITER must be connected to an assignable AMLC line, or to the PT45 video terminal. An ASSIGNABLE AMLC line is any available line that occurs after the terminal users, e.g. if lines 0-12 are terminal users, line 13 would be the first assignable line. The SPINWRITER is not supported on the VCP or SOC controllers. FIGURE 2-4 illustrates how to cable the SPINWRITER.

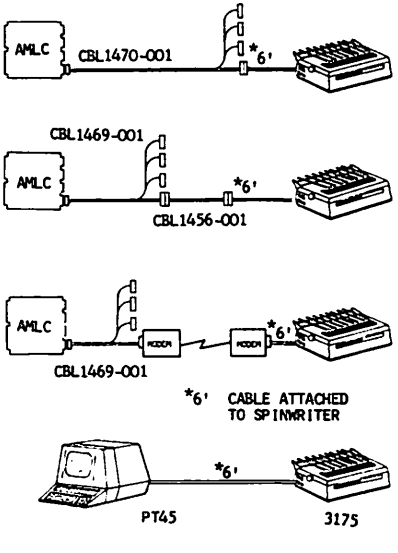

FIGURE 2-4: SPINWRITER CABLING

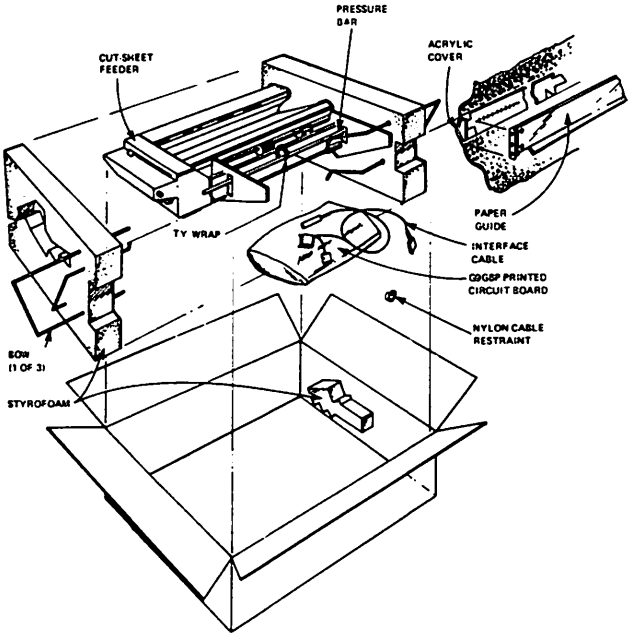

FIGURE 2-5: CUT-SHEET FEEDER UNPACKING DIAGRAM

CUT-SHEET FEEDER INSTALLATION

This section describes how to unpack and install the cut-sheet feeder. Follow these procedures step-by-step.

NOTE

These procedures should be followed to guarantee product warranty.

UNPACKING PROCEDURE

Unpack the cut-sheet feeder (see Figure 2-5) using the following procedure.

1. Remove the parts from the shipping carton. Save all packing material in case you must return the unit.
2. Make sure you have received all of the parts listed in Table 2-1. Notify the shipper of any shortages.
3. Remove all shipping tags and tapes from the unit.
4. Proceed to the installation procedure.

INSTALLATION PROCEDURE

TABLE 2-1: CUT SHEET FEEDER PARTS

Acrylic cover
G9GBP printed circuit board (PCB)
Power Cable (including nylon cable restraint)
Paper guide
Cut-Sheet Feeder (including bows)

To make installation easier, each part has its own procedure. Follow these procedures as they are listed, starting with the Acrylic Cover Installation.

Acrylic Cover Installation

1. Make sure that the SPINWRITER is turned off and unplugged.
2. Open the SPINWRITER top cover and remove the two mounting screws and bracket (see Figure 2-6). There are four mounting screws and two brackets; however, only one side has to be removed.
3. Install the new acrylic cover, making sure that it can move freely.

4. Proceed to the Power Supply Regulator Installation.

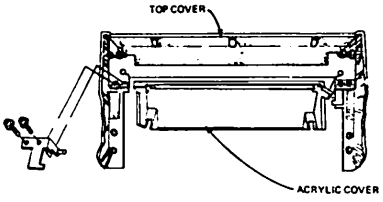

FIGURE 2-6: ACRYLIC COVER REPLACEMENT

Power Supply Regulator Installation

The SPINWRITER will now be supplied with a G9GBP Power Regulator instead of a G9BMT Power Supply Regulator. The G9GBP is a heavy duty version of the G9BMT. Existing supplies of the SPINWRITER may have the G9BMT installed. The following information is supplied in the event a SPINWRITER has a G9BMT installed.

1. Remove the Platen.

2. Remove the top and middle covers (removed as a single unit).

3. Loosen (do not remove) two PCB hold assembly screws (see Figure 2-7).

4. Unplug the flat cable on top of the interface PCB (second slot from rear).

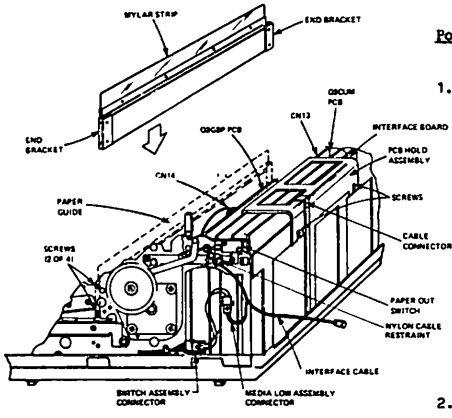

FIGURE 2-7: PRINTER CIRCUIT BOARD INSTALLATION

5. Remove the PCB holder assembly (see Figure 2-7).

6. Unplug the CN13 connector on the Driver Board (G9CUM) PCB (see Figure 2-7).

7. Remove the SPINWRITER paper guide assembly (see Figure 2-8) and unplug CN11 and CN12 on the G9BMT power regulator PCB.

8. Remove the Driver Board (G9CUM) PCB. (This PCB must be removed because the heat sink blocks the removal of the power regulator PCB.

9. Replace the old power regulator board (G9BMT) with the new power regulator board (G9GBP).

10. Reinstall the Driver Board (G9CUM) PCB and the PCB hold assembly, and plug in all the PCB plugs that were removed.

11. Proceed to the power cable installation.

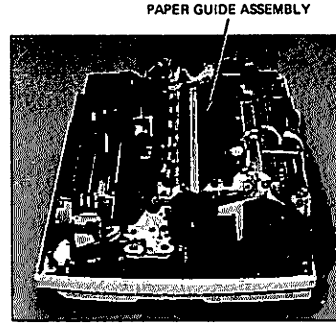

FIGURE 2-8: PAPER GUIDE ASSEMBLY LOCATION

Power Cable Installation

1. Unplug the SPINWRITER paper-out switch connectors and plug them into the two connectors on the interface cable (see Figure 2-10).

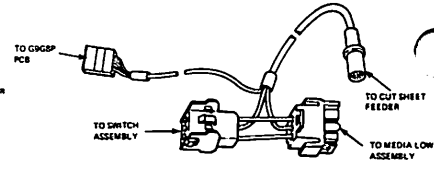

FIGURE 2-9: POWER CABLE

2. Insert the small plug on the interface cable through the printer side frame and plug it into CN14 on the G9GBP PCB (Figures 2-7 and 2-10).

3. Make sure the cut-sheet feeder plug exits the printer around the outside edge of the SPINWRITER interface cable plate.

4. Remove the front screw on the paper-out switch mounting bracket and install the cable restraint as shown in Figure 2-10.

5. Proceed to the paper guide installation.

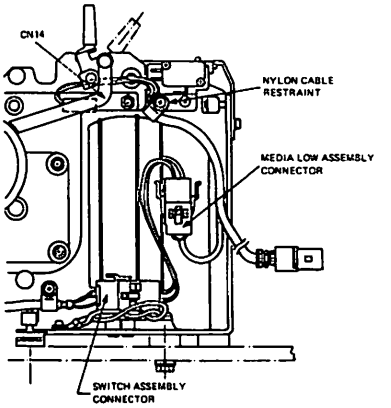

FIGURE 2-10: POWER ROUTE CABLE

Paper Guide Installation

The special paper guide ensures proper paper feed. Because it is possible to incorrectly install the paper guide, make sure that it is inserted with the mylar strip up and in front of the platen.

1. Slightly loosen the screws on the end brackets (Figure 2-11) and position the guide as shown in Figure 2-7.

2. Push the end brackets outward for a snug fit.

3. Remove the paper guide and tighten the end bracket screws.

4. Install the paper guide as shown in Figure 2-7 using the four mounting screws.

5. Replace the SPINWRITER paper guide, covers, and platen.

6. Proceed to the cut-sheet feeder installation.

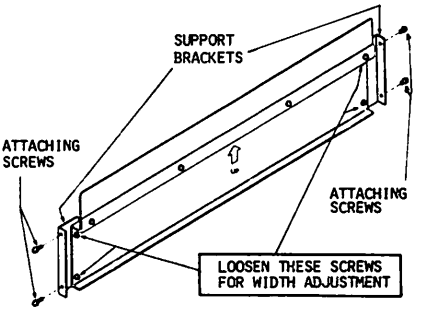

FIGURE 2-11: PAPER GUIDE ASSEMBLY

Cut Sheet Feeder Installation

1. Insert a print thimble and ribbon cartridge.

2. Swing the paper net to the rear of the printer and pull the paper bail forward.

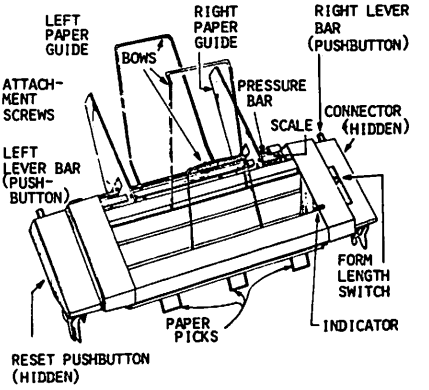

FIGURE 2-12: CUT SHEET FEEDER MAJOR COMPONENTS

3. Grasp the cut-sheet feeder on both ends, press in on the left and right lever bars (red pushbuttons) (Figure 2-12), and clip the cut-sheet feeder on the platen shaft.

NOTE

Make sure that the three paper pickers (Figure 2-12) slide below the SPINWRITER paper bail.

4. Move the paper release lever to the rear of the printer.

5. Plug the interface cable into the right side of the cut-sheet feeder (Figure 2-12).

6. Insert the cut-sheet feeder rear, middle, and front bows into their respective slots (Figure 2-13).

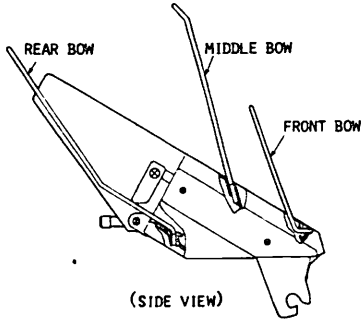

FIGURE 2-13: BOW INSTALLATION

AMLC ADDRESS CONVERSION (Table 2-2)

The existing PRIME systems in the field today, are designed to operate with up to 4 Asynchronous Multiline Controllers (AMLC's). Future PRIME systems will operate with up to 8 AMLC's. The device address for all eight AMLC's are listed below:

TABLE 2-2: AMLC STANDARD ADDRESSES

AMLC#1	'54
AMLC#2	'53
AMLC#3	'52
AMLC#4	'35
AMLC#5	'15
AMLC#6	'16
AMLC#7	'17
AMLC#8	'32

Boards shipped from the factory as spares or ADD-ON's are addressed as the 1st board ('54) in the system. For any other address the address jumpers will have to be moved. IC 37B selects the high order address bits '50, '30, and '10. IC 39B selects low order address bits '02 through '07. When changing addresses it is only necessary to move one end of the jumpers at loc. 37B and 39B.

TABLE 2-3: AMLC ADDRESS JUMPERS

DEV. ADDR.	IC 37B TO 31D PIN	IC 39B TO 31D PIN
'54	6 to 5	5 to 9
'53	6 to 5	4 to 9
'52	6 to 5	3 to 9
'35	4 to 5	6 to 9
'15	2 to 5	6 to 9
'16	2 to 5	7 to 9
'17	2 to 5	9 to 9
'32	4 to 5	3 to 9

AMLC BAUD RATE CONVERSION (Table 2-4 & 2-5)

AMLC boards have 8 different line speeds that are selectable by bits 8, 9 & 10 of the line control configuration word (OTA '0154). Four (4) of these line speeds are fixed (110, 134.5, 300, and 1200 Baud), one (1) is a programmable rate, and three (3) are selectable via hardware jumpers. The selectable rates are preset at the factory for 75, 150, and 1800 baud. On 515X series, these selectable clocks can be changed by changing the three jumpers on the header dip at location 1K. Table 2-4 shows the possible baud rate selections and corresponding pin numbers. The available baud rates to choose from are on IC 1K pins 1 to 8. Selected baud rates are taken from IC 1K pin 15, 10, & 13 They are selected by bits 8, 9 & 10 of the control word being set to binary 101, 110, and 111 respectively.

TABLE 2-4: AMLC BAUD RATE CONVERSION

CLOCK	PIN NO.	wire to	CLK	SELECT
CL00075+	1K pin 1			
CL00600+	1K pin 2		5	1K pin 15
CL00150+	1K pin 3			
CL19200+	1K pin 4		6	1K pin 10
CL09600+	1K pin 5			
CL04800+	1K pin 6		7	1K pin 13
CL02400+	1K pin 7			
CL01800+	1K pin 8			

The standard baud rate selection would be jumpered:

CLOCK5 75 baud = IC 1K pin 1 to 15
CLOCK6 150 baud = IC 1K pin 3 to 10
CLOCK7 1800 baud = pin 8 to 13

On 505X series, the selectable clocks are to be wired from test points on the board to the three selected clock inputs as shown in Table 2-5.

TABLE 2-5: AMLC BAUD RATE CONVERSION

CLOCK	TST PT.	Loc.	wire to	CLK	SELECT
CL00075+	TP 4	7K 15			
CL00150+	TP 5	1M 11			
CL00600+	TP 7	1M 13		5	39M 14
CL01800+	TP 8	9C 11			
CL02400+	TP 10	1L 11		6	37M 13
CL04800+	TP 11	1L 12			
CL09600+	TP 12	1L 13		7	39M 12
CL19200+	TP 13	1L 14			

The standard baud rate selection would be jumpered:

CLOCK5	75 baud	7K 15	to	39M 14
CLOCK6	150 baud	1M 11	to	37M 13
CLOCK7	1800 baud	9C 11	to	39M 12

VOLTAGE AND FREQUENCY CONVERSION (115V to 230V)

VOLTAGE CONVERSION

It is possible on SPINWRITERS with the Universal Power Supply to change the power requirement from 115 volts to 230 volts and visa versa. This procedure is for SPINWRITER's with the Universal Power Supply. To determine if the device has a Universal Power Supply continue with this procedure and if there is no switch on the power supply card you DO NOT have a Universal Power Supply. Non Universal Power Supplied can not be converted.

Materials For Conversion

Label - MEC0431-001 (Part Number Label)
Label - MEC1853-002 (230V label)
Label - MEC2929-001 (Blank metal label)
Fuse - FUS90628-05 (3 AMP fuse)

Tools Required

#1 Phillips head screw driver

Procedure

1. Turn the SPINWRITER power switch off and remove the power cord.
2. Open the top cover.
3. Pull the paper bail forward.
4. Unlock the left and right lock levers of the tractor feed assembly and remove the tractor feed assembly.
5. Simultaneously push both left and right platen clamp levers arms and remove the platen.
6. Hold the cover sides with both palms, and using the thumb move the middle cover release levers and disengage from the lever plate.
7. Lift the cover off vertically.
8. Lift and remove the paper guide assembly.
9. On the power supply card located beneath the paper guide assembly, just to the left of center, is located the 115/230 Volt switch. Refer to FIGURE 2-14 POWER SUPPLY CARD.

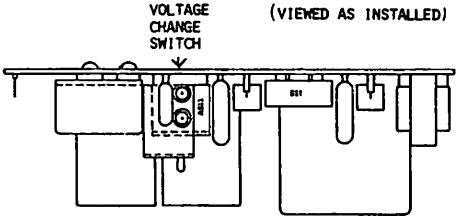

FIGURE 2-14: POWER SUPPLY CARD

10. Loosen, but do not remove the screw holding the switch bracket.
11. Slide the switch bracket half way and change the switch position.
12. Slide the switch bracket the rest of the way. The voltage, 230V, should be displayed.

13. Tighten the screw.

14. Reassemble the unit by reversing the removal procedure.

15. On the rear panel above the AC line cord, locate the voltage rating plate. Loosen and remove two screws and reverse the plate.

16. Insert and tighten the two screw. (FUSE 3A Input 230V should be displayed).

17. Remove the 5 AMP fuse, and install a 3 AMP fuse in its place.

NOTE

CHECK THE FUSE FOR ITS RATING. USE A 5 AMP FUSE FOR 115V, or a 3 AMP FUSE FOR 230V.

FREQUENCY CONVERSION

The Universal Power Supply is designed to operate with a range of frequencies between 50 and 60 hertz. There is no frequency conversion.

LABELING

1. Place a 230V warning sticker at the end of the line cord near the plug (MEC1853-002).

2. Type the words "230VAC 50HZ" on the blank metal sticker(MEC2929-001). Place the sticker over the words "115VAC, 60HZ" of the serial number name plate located on the printer base beneath the print carriage assembly.

3. Place a part number sticker (MEC0431-001) displaying the part number for a 50HZ unit - LPR4241-901 on the printer.

POWER ON AND INITIALIZATION TEST

This test checks AC and DC power distribution, reset and printer initialization.

1. Check that the AC power ON/OFF switches are OFF. These are located at the rear of the printer and on the operator control panel.

CAUTION

POWER ON TO THE PRINTER CAN BE CONTROLLED BY EITHER OF THE TWO (2) SWITCHES. HOWEVER, BOTH SWITCHES MUST BE OFF TO REMOVE POWER.

2. Connect printer power cord to appropriate AC receptacle.

3. Install print thimble and ribbon.

4. Move the carriage to the center of the platen.

5. Set front panel power switch to ON and look for the following conditions:

   A) The fan operates.

   B) The carriage moves left to the first print position.

   C) The print thimble rotates to the home position.

   D) The ribbon is retracted to the down position.

6. If any of the above conditions do not function correctly, immediately push the power ON/OFF switch to OFF. Refer to Chapter 6 for repair.

7. If the above conditions are met, proceed to the SELF-TEST.

SELF-TEST

Self-test prints a stored message line by line in a repetitive pattern to allow checking printer line feed and ribbon feed operation as well as printed character quality.

SELF-TEST OPERATION

1. Check that the power ON/OFF switches at the rear of the printer and on the operator panel are OFF.

NOTE

USE THE WIDEST PAPER AVAILABLE.

2. Install paper in the printer.

3. Set the forms length switch such that the number of columns to be printed is equal to 10 times the number dialed. i.e. If the forms length switch was set at 8, then 80 columns would be printed in the self-test mode.

4. Set the Remote/Local switch to LOCAL.

5. Set the TEST switch on the control panel to ON.

6. Set the power ON/OFF switch to ON. The printer should initialize and print the test pattern repetitively. Character spacing of 10 or 12 pitch and line spacing of 6 or 8 lines per inch can be selected using the SP and LF switches on the operator control panel.

7. Run the test pattern for five (5) minutes. Set the power ON/OFF switch to OFF and remove the printout. Examine the printout for the following:

   A) fully formed characters

   B) proper line feed and ribbon feed operation

   C) print quality

Figure 2-15 is an example of the test pattern expected. The character's that are printed are dependend on the type of print thimble installed.

ON-LINE CHECKOUT

On line testing of the SPINWRITER can be performed, only, after the PRIMOS or OAS Spooler has been modified to indicate the presence of the printer on the AMLC line. Refer to the AMLC SPOOLER INSTALLATION, APPENDIX A.

```
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 123 456 7890 +-X:=$%()   The quick brown fox jumps over the lazy dog / [] {}
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 123 456 7890 +-X:=$%()   The quick brown fox jumps over the lazy dog / [] {}
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 123 456 7890 +-X:=$%()   The quick brown fox jumps over the lazy dog / [] {}
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 123 456 7890 +-X:=$%()   The quick brown fox jumps over the lazy dog / [] {}
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THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 123 456 7890 +-X:=$%()   The quick brown fox jumps over the lazy dog / [] {}
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THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 123 456 7890 +-X:=$%()   The quick brown fox jumps over the lazy dog / [] {}
```

FIGURE 2-15: TYPICAL SELF-TEST PATTERN

CHAPTER 3
OPERATING INSTRUCTIONS

INTRODUCTION

This chapter describes how to operate the SPINWRITER. It describes the control panel switches and indicators it gives you instructions on how to load the paper and position it, and outlines step by step procedures to run the machine. Figure 3-1 shows SPINWRITER controls and external components.

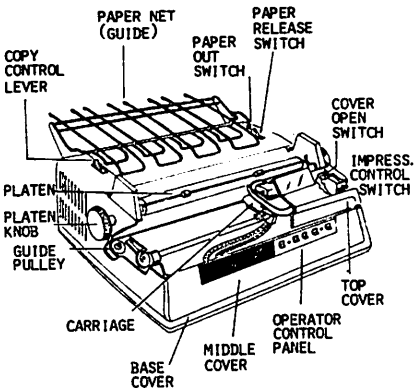


FIGURE 3-1: CONTROLS AND EXTERNAL COMPONENTS

OPERATOR CONTROL PANEL

Table 3-1 below, lists the control and indicators on the control panel. Some switches on the panel are protected by an acrylic panel. Figure 3-2 shows the control panel for a SPINWRITER.

TABLE 3-1: CONTROL PANEL SWITCHES & INDICATORS

POWER - 2 position rocker switch that controls AC power to the SPINWRITER

POWER INDICATOR - Illuminates when AC power is applied.

SET TOF - Spring-loaded rocker switch that stores the contents of the FORM LENGTH thumbwheel switches.

NOTE

Position paper at desired first line before pressing this switch.

FF- (FORM FEED) Spring-loaded rocker switch that will cause the printer to perform a Top of Form paper feed.

ALARM - Indicator - Illuminates if one of the following occurs: Parity Error, Framing Error, Cover Open, Paper Out, Ribbon End, Check Condition, Buffer Overflow.

ALARM - Audible

1. Sounds for 1/2 second when errors are produced.
2. Sounds for 1/2 second upon receipt of a Bell Code
3. For a check condition, a repeating audible alarm is produced.

RESET - Spring-loaded switch which clears the ALARM indicator if the ALARM condition has been cleared. Light is extinguished.

SP 10-12 - 2 position rocker switch which selects either 10 or 12 characters per inch. It is set at 10 for 10 pitch thimbles and 12 for 12 pitch thimble.

NOTE

Spacing between characters may also be altered by the HORIZONTAL MOTION INDEX.

LF 6-8 2 position rocker switch selects either 6 or 8 lines/in for line spacing.

NOTE

Spacing between lines may also be altered by the VERTICAL MOTION INDEX.

LOCAL LF - 2 position rocker switch that enables auto line feed when set at ON. This is set to OFF for PRIME.

DUP F-H - 2 position rocker switch that selects full or half duplex. This switch is only applicable to a SPINWRITER that has a keyboard.

PARITY E-M-O - 3 position rocker switch that selects odd, even, or mark (for mark setting, there is no parity checked and mark polarity is generated). Set to MARK for PRIME.

SPEED H-M-L - 3 position rocker switch that selects high, medium, or low communication speed. Standard configuration of 110 (low), 300 (med), & 1200 (high) baud. The setting of this switch must agress with the baud rate the AMLC line is operating at. Refer to Figure 3-4 for optional line speed configurations.

TEST - 2 position rocker switch that enables the self-test mode. Leave off for normal operation.

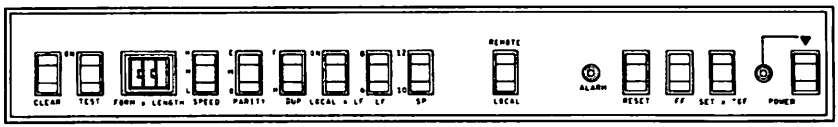


FIGURE 3-2: OPERATOR CONTROL PANEL

FORM Length - Two 10 position thumbwheel switches used to specify form length from 1 to 99 lines.

1. Specify form length from 1 to 99 lines. (Based on LF 6-8 switch, a form will have 6 or 8 lines to the inch.)

2. When in self-test, thumbwheel switch designation, times 10 equals desired column width. (Applies for settings 03 through 13)

CLEAR - Spring-loaded rocker switch that clears the SPINWRITER. It is equivalent to power ON/OFF clear.

REMOTE/LOCAL - 2 position rocker switch. In REMOTE position, SPINWRITER receives and transmits data. LOCAL position, the SPINWRITER is off-line and all data transmission stops.

PAPER POSITIONING AND PRINTING ADJUSTMENTS

Figure 3-3 illustrates the controls you use to position paper and to make adjustments for print quality. The numbers in the following paragraphs correspond to the numbers in the figure.

1. Platen Knob - These knobs allow the platen to be rotated manually to insert paper and position it properly. The ~~right~~ knob ~~provides variable platen action~~; when you push the knob in, the platen rolls freely in either direction. You can change the position of the printing line by using this variable platen function.

2. Copy control lever. This lever moves the platen forward or backward to compensate for different form thicknesses (number of carbons). ~~Place it all the way forward for a single copy, and all the way toward the rear for an original and 5 carbons copies.~~ Intermediate position provides for form thicknesses between these two extremes. When printing on a form of several copies you may have to increase the print hammer intensity for optimum print quality by changing the impression control switch (see Figure 3-3, #9).

3.&4. Pressure bail levers and pressure bail. The pressure bail holds the paper against the platen. This is necessary for optimum print quality and quietness. To insert paper, pull the bail forward, away from the platen, by moving one of the levers. When using a pin-feed platen or forms-tractor assemby, move the pressure bail forward away from the platen. The pin-feed paper or the forms-tractor assembly doors hold the paper in the optimum position for proper operation.

5. Ribbon selector switch. The ribbon selector switch is located under the top cover under the ribbon carriage black lever. PLace this switch to the left for black ribbon or multi-strike ribbon, and to the right for red/black ribbons.

6. Silencer hood with combination scale. The silencer hood lowers the printer operation noise. A long and short hood are available, but a shoot hood must be used with a forms-tractor assemby or a pin-feed platen. When you raise the hood or the scale, an interlock is activated which inhibits printing. This interlock has two positions, 1 for maintenance the other for normal operation. To place the switch in maintenance position gently pull the switch upward till is locks (about 1/4 inch).

   The scale on the hood provides a visual indication of the print head position along the typing line. It is marked for both 10 and 12 characters per inch.

7. Top cover. The top cover raises easily by lifting upward. If the Cut Sheet Feeder is installed it must be removed prior to raising the cover. Raising the cover provides access to the printer mechanism when it becomes necessary to replace a ribbon cartridge, to change a print thimble, or to change the hammer impression control switch. When you raise the cover, a interlock is activated which inhibits printing the audible alarm sounds and the alarm on the control panel lights. Therefore, be sure the cover is closed tightly.

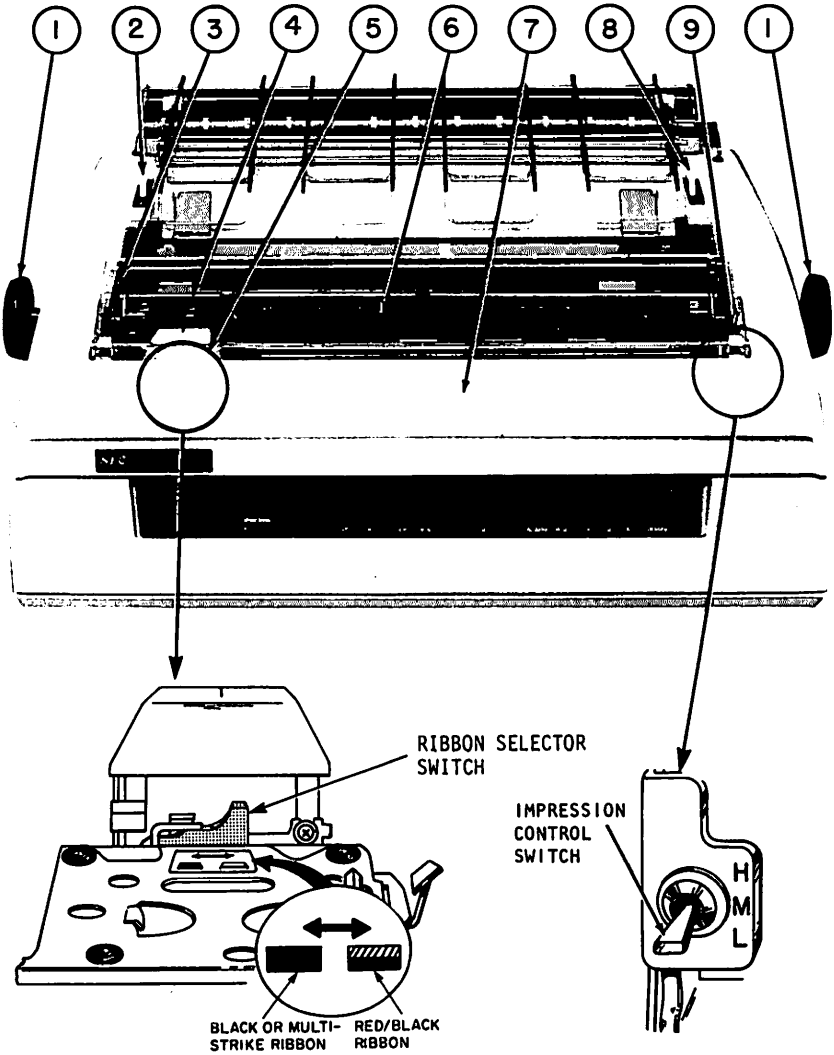


FIGURE 3-3: PRINTER CONTROLS

8. Paper Release lever. In the forward position, this lever releases tension on the paper, allowing you to reposition or remove the paper. Place the lever in the backward position when printing on a friction-feed platen to ensure proper feeding of paper. Place it forward when using the FORMS TRACTOR

9. Impression control switch. This three-position switch located under the top cover controls the printing impression. You may set this switch as follows:

   A) L - low for minimum impact pressure which may be required for small typefaces (12 pitch)

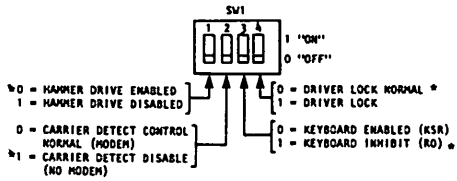
   B) M - medium for normal impact pressure which is required for most single copy printing.

   C) H - high for maximum impact pressure normally only for multiple copies.

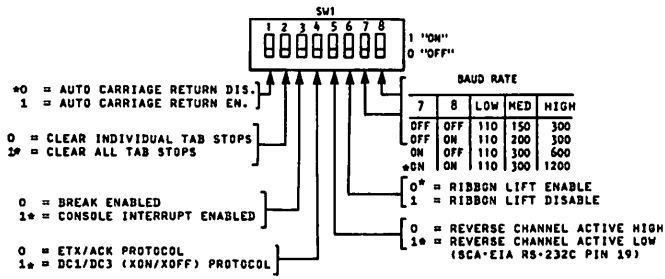
   Poor print quality may result from the incorrect setting of this switch, too high a setting will reduce font life.

PRINTED CIRCUIT BOARD DIP SWITCHES

The Micro-processor board and the Control Panel both contain dip switches that effect the operation of the SPINWRITER. Figure 3-4 indicates the purpose and correct setting of these switches.


SW1
1 2 3 4
1 "ON"
0 "OFF"
*0 = HAMMER DRIVE ENABLED
1 = HAMMER DRIVE DISABLED
0 = CARRIER DETECT CONTROL NORMAL (MODEM)
*1 = CARRIER DETECT DISABLE (NO MODEM)
0 = DRIVER LOCK NORMAL *
1 = DRIVER LOCK
0 = KEYBOARD ENABLED (KSR)
1 = KEYBOARD INHIBIT (RO) *

G9DWH MICROPROCESSOR PCB


SW1
1 2 3 4 5 6 7 8
1 "ON"
0 "OFF"
*0 = AUTO CARRIAGE RETURN DIS.
1 = AUTO CARRIAGE RETURN EN.
0 = CLEAR INDIVIDUAL TAB STOPS
1* = CLEAR ALL TAB STOPS
0 = BREAK ENABLED
1* = CONSOLE INTERRUPT ENABLED
0 = ETX/ACK PROTOCOL
1* = DC1/DC3 (XON/XOFF) PROTOCOL
BAUD RATE
7 | 8 | LOW | MED | HIGH
OFF | OFF | 110 | 150 | 300
OFF | ON | 110 | 200 | 300
ON | OFF | 110 | 300 | 600
*ON | ON | 110 | 300 | 1200
0* = RIBBON LIFT ENABLE
1 = RIBBON LIFT DISABLE
0 = REVERSE CHANNEL ACTIVE HIGH
1* = REVERSE CHANNEL ACTIVE LOW (SCA-EIA RS-232C PIN 19)

G9DGD CONTROL PANEL PCB

* INDICATES SETTINGS FOR PRIME

FIGURE 3-4: PRINTED CIRCUIT BOARD SWITCH FUNCTIONS

CONTROL CODES

The SPINWRITER control logic recognizes and processes the control codes listed below. The Model 5515 SPINWRITER does not have a keyboard (other SPINWRITER models do) to generate these control codes. They are listed here for reference when controlling the SPINWRITER from a file that is being printed. Table 3-6 indicates the ASCII CODES in octal, hex, and binary representations. The CODE or CODE sequence must be in a file that is to be spooled to the SPINWRITER. The examples given are the sequence that a program would follow when controlling the printer.

TABLE 3-2: CONTROL CODES

CNTRL CODE(S)	FUNCTION
CNTRL A or a	SOH (Start of Heading)
CNTRL B or b	STX (Start fo Text)
CNTRL C or c	ETX (End of Text)
CNTRL E or e	ENQ (Enquiry)
CNTRL F or f	ACK (Acknowledge)
CNTRL G or g	BEL (BELL- ALARM)
CNTRL H or h	BS (Backspace)
CNTRL I or i	HT (Horizontal tab)
CNTRL J or j	LF (Line feed)
CNTRL K or k	VT (Vertical tab)
CNTRL L or l	FF (Form feed)
CNTRL M or m	CR (Carriage return)
CNTRL N or n	SO (Shift out)
CNTRL O or o	SI (Shift in)
CNTRL P or p	DLE (Data Link Escape)
CNTRL Q or q	DC1 (Device control 1)
CNTRL R or r	DC2 (Device Control 2)
CNTRL S or s	DC3 (Device control 3)
CNTRL T or t	DC4 (Device control 4)
CNTRL U or u	NAK (Negative Acknowledge)
CNTRL V or v	SYN (Synchronous Idle)
CNTRL W or w	ETB (End of Transmission Block)
CNTRL X or x	CAN (Cancel)
CNTRL Y or y	EM (End of Medium)
CNTRL Z or z	SUB (Substitute)
CNTRL ESC	ESC (Escape)
CNTRL ^	RS (Record Separator)
CNTRL _	US (Unit Separator)
CNTRL \	FS (File Separator)

ESCAPE CODES

The ESC control character is a 2 or 3 character sequence used to alter normal printing, carriage movement, or paper movement. The character (ESC) initiates specific "escape" sequences when received from the AMLC.

TABLE 3-3: ESCAPE KEY FUNCTIONS

CODE(S)	FUNCTION
ESC 1	Set horizontal tab Stop
ESC 2	Clear all tab stops
ESC 3	Graphics ON
ESC 4	Graphics OFF
ESC 5	Forward print ON
ESC 6	Backward print ON
ESC 8	Clear individual tab stop
ESC 9	Set left margin
ESC 0	Set right margin
ESC A	Print in RED
ESC B	Print in BLACK
ESC D	Negative half-line feed
ESC U	Half-line feed
ESC LF	Negative line feed
ESC HT (n)	Absolute Horizontal tab
ESC VT (n)	Absolute vertical tab
ESC RS (n)	Define vert. motion index (VMI)
ESC US (n)	Define horz. motion index (HMI)

where (n) = ASCII character whose decimal value equals the desired number plus 1

Examples of escape usage follows:

If an ** is included with the instruction, refer to TABLE 3-4, DECIMAL VALUES FOR ASCII CHARACTERS.

1. To set left margin, at the current position of the carriage assembly, the following sequence is followed:

   1st character ESC
   2nd character 9

2. To perform an absolute vertical tab to line 52, the following 3-character ESC sequence is used:

   1st character ESC
   2nd character CNTRL with K
   3rd character 5 **

3. To perform an absolute horizontal tab to column position 65 the following 3-character ESC sequence is used:

   1st character ESC
   2nd character CNTRL with I
   3rd character B **

4. To change spacing between characters (Horizontal Motion Index HMI) and between lines (Vertical Motion Index VMI), press ESC key, the CNTRL key and another key at the same time, and the desired setting PLUS 1.

   1st character ESC
   2nd character CNTRL with _
   3rd characters CNTRL K **

TABLE 3-4: DECIMAL VALUES FOR ASCII CHARACTERS

Tens	Units 0	1	2	3	4	5	6	7	8	9
0		SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT
10	LF	VT	FF	CR	SO	SI	DLE	DC1	DC2	DC3
20	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS
30	RS	US	SP	!	"	#	$	%	&	
40	(	)	*	+	,	-		/	0	1
50	2	3	4	5	6	7	8	9	:	;
60	<	=	>	?	@	A	B	C	D	E
70	F	G	H	I	J	K	L	M	N	O
80	P	Q	R	S	T	U	V	W	X	Y
90	Z	[	\	]	^	_	`	a	b	c
100	d	e	f	g	h	i	j	k	l	m
110	n	o	p	q	r	s	t	u	v	w
120	x	y	z	{	|	}	~			

5. To set VMI at 53, press the following keys in this order:

   1st character ESC
   2nd characters CNTRL with
   3rd character 6 **

6. To set Graphics, use the ESC 3 character to Reset, use ESC 4.

While in the Graphics Mode, carriage movement is completely separated from printing; that is, printing a character does not automatically move the carriage. The carriage is moved only by executing a tab, space, carriage return, or backspace operation.

The tab commands operate the same as they do in Normal mode. In Graphics mode, however, the space and backspace commands move the carriage only 1/60 inch instead of the Horizontal Motion Index (HMI) selected.

Paper movement commands can be used extensively in Graphics. Vertical Tab (VT) and Form Feed (FF) operations are unchanged, but the line feed (LF) and Negative Line Feed (ESC LF) cause only 1/48 inch of paper movement, instead of the full line Vertical Motion Index (VMI) movement performed in normal mode.

The SPINWRITER as supplied by PRIME does not have a keyboard. In order to test an escape or control code sequence it is necessary to create and spool a file to the SPINWRITER.

An example of checking the escape code sequence that does a ABSOLUTE HORIZONTAL TAB to column 50 is:

```
OK, ed
INPUT
AAAAAAAAAA^233^2113AAAAAAAAAAAAAAAA (CR)
(CR)
EDIT
FIL TEST

OK, SPOOL TEST -AT NEC
[SPOOL rev 17.6]
Your spool file, PRT001, is      1 record long.

OK,
```

This test will cause a series of 10 A's to be printed, and then tab to position 50. A series of 15 A's is then printed starting at position 51.

CONTROL CODE DESCRIPTION

The SPINWRITER control logic recognizes and processes the control codes listed in Table 3-2 received from the AMLC. These control characters received from the AMLC are processed along with the 94 printable characters of the ASCII code set.

The ESC control character is a 2 or 3-character sequence used to alter normal printing, carriage movement, or paper movement. This character initiates specific "escape" sequences when received from the AMLC. The ESC sequences for the SPINWRITER are listed in Table 3-3. These are 2-character sequences. Three character sequences are an extenson of horizontal tab, vertical tab, character spacing, and forms advance length are included in the following descriptions.

CARRIAGE MOVEMENT CONTROL CODES

There are several codes that affect carriage movement. These are described in the following paragraphs.

Backspace (BS)

On receipt of a BS code, the indicated backspacing is performed. The number of backspaces is set for 1/10 or 1/12 inch. This number is used for spacing, spacing after each character, and backspacing. Backspacing does not operate beyond the left margin. In the reverse print mode, BS moves the carriage one print position to the right.

Carriage Return (CR)

Receipt of a CR code causes the carriage to move to the left margin. It also causes a line feed if the AUTO LF key is depressed. CR also restores Reverse Print to Forward Print.

Normal Horizontal Tab (HT)

Normal tabbing is done using CNTRL I. The carriage is moved to the desired tab positions and ESC 1 is used set the tab position.

Key sequence ESC 2 clears individual horizontal tabs or all tabs (see SW1-2 on G9DGD board).

Absolute Horizontal Tab (ESC HT (n))

Control I is the control code sequence to perform an horizontal tab (HT). Using absolute horizontal tab, the carriage can be positioned directly to any of the first 126 print positions without the need for prior setting of tab stops. This is accomplished by providing an ESC character and CONTROL I followed by the ASCII character whose decimal value indicates the print position desired (Refer Table 3-4, DECIMAL VALUES FOR ASCII CHARACTERS). For example, set absolute horizontal tab at 65 the command sequence ESC, CNTRL with I, and A would be used.

Right Margin, Left Margin (ESC 9, ESC O)

On receipt of ESC O, the right margin is set at the present print position. On receipt of ESC 9, the left margin is set to the present print position.

Reverse Print, Forward Print (ESC 5, ESC 6

The sequence ESC 6 initiates the reverse print mode. In this mode, the characters are printed as the carriage moves from right- to-left. The paper feed codes and HT are executed as normally set.

The forward print mode (left-to-right) is restored by the sequence ESC 5 or a carriage return (CR).

PAPER PLATEN MOVEMENT CONTROL

The codes that affect paper movement are described in the following paragraphs.

Line Feed (LF)

On receipt of the LF code, the selected line feed increment is performed. The operator selects the line feed for 6 or 8 using the LF switch on the operator control panel.

Reverse Line Feed (ESC LF)

On receipt of ESC LF, the platen (and, hence the paper) is reversed by one line. The distance the paper moves is determined by LF switch on the operator control panel, or pre-programmed vertical pitch setting.

Half-Line Feed (ESC U)

On receipt of ESC U, a half-line feed is performed.

Negative Half-Line Feed (ESC D)

On receipt of ESC D, a negative half-line feed moves the form down one-half line.

Absolute Vertical Tab (ESC VT (n))

Control K is the control code sequence to perform a vertical tab (VT). Using absolute vertical tab, the form can be moved directly to any of the first 126 lines on the page from any other line on the page. This is accomplished by providing a 3-character sequence ESC VT (n), where the (n) represents an ASCII character whose decimal value is equal to the number of lines on the form to be reached (TABLE 3-4). For example, set vertical tab at 52 and press keys ESC, CNTRL with K and 4.

Define Horizontal Motion Index (ESC US (n))

The Horizontal Motion Index (HMI) is the number of 1/120-inch increments that the carriage moves after spacing or printing a character. Minimum HMI is 0 (no spacing) and maximum is 125. The HMI is executed by a 3-character sequence ESC US (n). ESC US is equivalent to Control _ (underline). The character (n) represents the ASCII character whose decimal value is one greater than the number of increments the carriage will move. For example, to set the HMI to be equal to printing 12 character per inch, you divide the number of character per inch into 120. This would give you 10. The decimal value you are interested in is 1 greater than 10, or 11. Referring to TABLE 3-4 find the number 11 on the chart. It indicates that a VT or Vertical Tab should be entered in the place of (n). Referencing TABLE 3-2 we find that the VT is equal to CONTROL K. This is an example only, to set the number of characters per inch, at the standard 10 or 12, you would use the switch on the front panel. An example of what changing the HMI does to a line of print is shown in FIGURE 3-5.

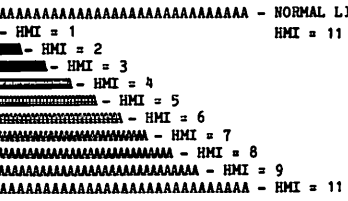

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA - NORMAL LINE -
A- HMI = 1 HMI = 11
- HMI = 2
- HMI = 3
- HMI = 4
- HMI = 5
- HMI = 6
- HMI = 7
- HMI = 8
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA - HMI = 9
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA - HMI = 11

FIGURE 3-5: HORIZONTAL MOTION INDEX EXAMPLE

Define Vertical Motion Index (ESC RS (n))

Vertical Motion Index (VMI) is the number of 1/48-inch increments the platen (paper) moves for each line feed or negative line feed. Minimum VMI is 0 and maximum is 125. The VMI is executed by a 3-character sequence ESC RS (n). RS is equal to CONTROL^. The value for (n) is the ASCII character whose decimal value is one greater than the number of increments the paper will move (Refer to TABLE 3-4). For example, setting the VMI to 3 would produce FIGURE 3-6. To set the VMI to 3, press ESC, CNTRL & ^, and CNTRL & D.

AAAAAAAAAA - This is a normal line of A's
The following is the same line of A's
printed with a VMI of 3.

FIGURE 3-6: VERTICAL MOTION INDEX EXAMPLE

RED/BLACK PRINTING (ESC A, ESC B)

The printer is initialized for printing in black. To print in red, ESC A sequence is issued. To print in black, ESC B sequence is issued.

GRAPHICS (ESC 3, ESC 4)

On receipt of ESC 3, graphics mode is set and receipt of ESC 4 resets the graphics mode.

While in the graphics mode, carriage movement is completely separated from printing, that is, printing a character does not automatically move the carriage. The carriage is moved only by executing a tab, space, carriage return, or backspace.

The tab commands operate the same as they do in normal mode. In graphics mode, however, the space and backspace commands move the carriage only 1/60 inch instead of the horizontal index selected.

Paper movement commands can be used extensively in graphics. Vertical tab (VT) and FF operations are unchanged, but LF and ESC LF cause only 1/48 inch of paper movement, instead of the full line (VMI) movement performed in normal mode.

MAINTAINING HIGH QUALITY PRINT

To ensure high print quality, proper attention should be given to such items as different printer control settings, paper quality, ribbon quality, etc.

1. Select the proper ribbon. Multi-strike ribbons give you sharper impressions than a fabric ribbon. Dried or malfunctioning ribbons result in faded print images.

2. Choose high quality paper to obtain the best print image, sharpest characters and maximum black-and white contrast.

3. Select the proper copy control lever setting, all the way forward for single copy and moved rearward as necessary for additional copies.

4. Set the impression control switch for the best print image, low for small typefaces (12 pitch), medium for normal impact pressure, and high for large typefaces or multiple copies.

5. Set the space pitch setting so that it matches the pitch of the thimble being used, a mismatch will result in cramped or widely spaced characters.

7. Keep the platen clean and free of mars and scratches.

RIBBON CARTRIDGE

Replace the fabric ribbon cartridge at intervals to maintain clear printing. Replace the multistrike ribbon cartridge when the ribbon fills the ribbon window to E and the ribbon has a yellow cross-hatch pattern.

REMOVAL

Replace the ribbon cartridge as follows:

1. Turn POWER off and raise the top cover.

2. Hold the ribbon cartridge lightly at the same time, push down on the two locking tabs which hold the cartridge in place, lift the cartridge out.

REPLACEMENT

1. Take the new cartridge and rotate the manual feed knob in the direction indicated by the arrow to establish tension on the ribbon.

2. Place the new ribbon cartridge over the mounting plate insert the ribbon between the cardholder and the card holder bracket.

3. Insert the ribbon in the ribbon sensor if a multistrike ribbon is being used.

4. Press the ribbon cartridge downward until the locking tabs engage.

NOTE

It may be necessary to rotate the manual feed knob on the cartridge in the direction indicated by the arrow to ensure proper seating.

5. Check tension on the ribbon.

6. Close the top cover and restore ac power.

PRINT THIMBLE

REMOVAL

The print thimble may be replaced as follows:

1. Turn POWER off and raise the cover.

2. Remove the ribbon cartridge.

3. Push hammer lock lever toward the platen, at the same time tilt the hammer cover toward the front.

4. Slide the lock piece, at the center of the print timble, horizontally and then to the upright position.

NOTE

When handling print thimble, hold it at the base to avoid possible damage to the character type areas.

5. Lift the print thimble upward from the carriage.

REPLACEMENT

1. Place new print thimble in position aligning the square hole with the stud.

NOTE

Be sure that the replacement thimble (10 or 12) and the pitch setting match, and use light pressure on the base of the thimble to ensure that it is seated fully downward.

2. Lay the lock piece flat and slide it until it is positioned.

3. Push the hammer and its cover into the locked position.

4. Install the ribbon cartridge.

5. Close the cover and restore ac power.

CUT-SHEET FEEDER OPERATING INSTRUCTIONS

Make sure that the paper used in the cut-sheet feeder conforms to the following specifications.

Weight: 18 to 24 pounds
Width: 5.5 to 12 inches
Length: 3.61 to 14 inches

The following multiple-part forms can be used with the cut-sheet feeder.

1. Six-part NCR chemical paper, top glued

2. Four-part single-use carbon, 20 pounds, top glued

Many other different types of multi-part forms are available. It may be possible that some of these forms can also be used. However, be sure to thoroughly test them under working conditions before using them.

To operate the cut-sheet feeder, use these procedures. Note that an example follows the procedures.

1. Lift up on the cut-sheet feeder pressure bar (Figure 2-12), making sure that both ends are lifted.

2. Loosen the cut-sheet feeder attachment screws (knurld thumbscrews) (Figure 2-12) by hand.

3. Use the scale (Figure 2-12) and adjust the paper guides so that the paper will be used in the center portion of the platen.

4. Insert the paper, making sure it is stacked neatly.

NOTE

Do not overload the paper tray.

5. Make a final adjustment on the paper guides and tighten the thumbwheel screws.

NOTE

To ensure proper paper feeding, make sure the paper guides are not excessively tight against the paper edges.

6. Press down on the pressure bar. Make sure the pressure bar is pushed down on both sides.

7. Using your paper length as a reference, set the cut-sheet feeder form length slide switch as shown in Table 3-5. The difference between the cut-sheet feeder form length slide switch setting and the paper length must always be 1 unit or greater. For example, set the switch to 12 when using 11-inch paper, or set the switch to 13 for 11.1-inch paper (1 greater than 11.1 is 12.1, there is no setting for 12.1, so you use 13).

8. Set the SPINWRITER FORM LENGTH switch as shown in Table 3-5. (This setting is equal to the cut-sheet feeder form length slide switch setting times the LF(6/8) switch setting.) For example, for an 11-inch form:

   A. Set the cut-sheet feeder forms length switch to 12.

   B. Set the SPINWRITER FORM LENGTH switch to 72 (12 x 6 LPI = 72).

NOTE

If the paper is slightly over 11 inches, set the switches to 13 and 78.

9. Plug in the SPINWRITER and turn it on. (The cut-sheet feeder red indicator should be blinking.)

10. Move the carriage to the center of the platen using remote commands.

11. Manually turn the platen and position the paper at the desired top of form. (Indicator stops blinking and stays on.)

NOTE

Never move the paper more than one line reverse; otherwise an error condition occurs.

12. Set the left and right margins within the left and right edges of the paper.

NOTE

When the paper is out, the cut-sheet feeder indicator blinks rapidly and the buzzer sounds. To reset the buzzer, press the RESET buttons on the cut-sheet feeder and SPINWRITER.

TABLE 3-5: PAPER LENGTH SWITCH SETTINGS

PAPER LENGTH	SPINWRITER FORM LENGTH THUMBWHEEL SETTING		CUT SHEET FEEDER SLIDE SWITCH SETTING
	6 LPI+	8 LPI	
3.61 to 4	30	40	5
4 to 5	36	48	6
5 to 6	42	56	7
6 to 7	48	64	8
7 to 8	54	72	9
8 to 9	60	80	10
9 to 10	66	88	11
10 to 11	72	96	12
11 to 12	78	104*	13
12 to 13	84	112*	14
13 to 14	90	120*	15
14 to 17	108*	144*	. (DOT)

+Lines per inch.
*Two FF codes must be sent if there is to be no printing on the bottom half of the sheet.

USAGE EXAMPLE

Paper
Use 8-1/2 x 11 inch, 20 lb. bond; specify printing at 6 lines per inch.

Procedures

1. Set cut-sheet feeder form length switch to 12. (Set the switch to 13 if the paper is slightly over 11 inches.

2. Set SPINWRITER FORM LENGTH switch to 72. (Set the switch to 78 if the cut-sheet feeder form length slide switch is set to 13.)

3. Set left margin not to exceed 4-1/4 inches left of center.

4. Set right margin not to exceed 4-1/4 inches right of center.

5. Manually advance paper by turning platen to desired top of form position.

6. Press SPINWRITER SET TOF switch.

VEST.AMLC.1 AMLC ROUTINE TO XMIT CHARACTERS VIA DMT

This routine will continuously transmit any data representation in Sense Switch 9 through 16, provided SSW1 is Set.

```
LOC.  MEMORY  INSTRUCTION      COMMENTS

1000  031754  OCP  '1754      Initialize
1001  005050  LDA  '1050      Load A register with DMT Base Address
1002  171554  OTA  '1554      Output DMT base address to AMLC
1003  003002  JMP  *-1        Wait for OTA to finish
1004  005051  LDA  '1051      Load A register with LINE CONFIGURATION
1005  170154  OTA  '0154      Output LINE CONFIGURATION to AMLC
1006  003005  JMP  *-1        Wait for OTA to finish
1007  005052  LDA  '1052      Load A register with LINE CONTROL
1010  170254  OTA  '0254      Output LINE CONTROL to AMLC
1011  003010  JMP  *-1        Wait for OTA to finish
1012  131620  INA  '1620      Input Sense Switches to A Register
1013  111050  STA* '1050
1014  105050  LDA* '1050
1015  100040  SZE              Skip next instruction if A register is equal to 0
1016  003014  JMP  *-2        Keep checking transmit buffer until it's empty
1017  003012  JMP  *-5        Transmit Buffer is empty, refill it

      ......

1050  0020XX                   DMT BASE ADDRESS (XX is Line #)
1051  XX0313                   LINE CONFIG. (1200 Baud, no Parity, 1 stop bit & 8 bits)
1052  XX0010                   LINE CONTROL (transmit enable) (XX = Line #)
```

OPERATING INSTRUCTIONS

Enter the octal representation of the vest as listed in the Memory column, setting the value of XX in locations '1050 - '1052 to the line #.

Set SSW1 and the desired character in SSW9-16 and start.

This routine will continuously transmit any data representation in Sense Switch 9 through 16, provided SSW1 is Set.

This routine will keep transmitting data until it is halted.

To change the line number, change locations indicated with XX to be the new octal value of the line number.

This program does not input any data nor does it display what is being transmitted.

To view the character transmitted connect a terminal to the line.

CHECKING THE PROGRAMMABLE CLOCK

The above vest routine may be modified to use the programmable clock by installing the following patches.

```
1004  003020  JMP  '1020      Jump to the patch to output clock
      ......
1020  005053  LDA  '1053      Load A register with programmable clock constant
1021  171754  OTA  '1754      OTA the constant to the AMLC
1022  003021  JMP   *-1
1023  005053  LDA  '1051      Replaces the LDA at '1004
1024  003005  JMP  '1005      Return to the main loop
      ......
1051  000413                   (programmable clock, no partity, 1 stop bit)
1053  000013  OCT   '13        (Constant for clock - 13 is 9600 Baud)
```

REMEMBER to change the LINE CONFIGURATION ('1051) to indicate the use of the programmable clock.

FIGURE 3-7: ROUTINE TO TRANSMIT CHARACTERS VIA DMT

T&M LQPT1 INSTRUCTIONS

LQPT1 T6MSR11, PAM, 10-JUN-80, REV. 3
Serial Letter Quality Test
Prime Computer Inc., SRC 1356.003
Copyright 1980 (c) Prime Computer Inc.,
Framingham, Mass.

Rev.3 compared to Rev. 2 the OPTA, SOC driver has been deleted

Rev.2 compared to Rev.1 the 150 baud rate has been changed to 110 baud. More comments have been added. Test 11 was modified to not cut paper, unused variables and routines were removed. Test titles now print on printer. Title for test 8 is now sheet feeder compatable.

HOW TO USE

1. Master clear and start at 1000.

2. Sense switches are used as follows:

SS1 SET- Run test or tests and ask configuation question after pass completion, also allow 13 bit address display. Machine check entered if SS1 is not set at start of program.

SS1 RESET- Loop on tests specified and allow 12 bit display

SS2 SET- Inhibit error printout.

SS3 SET- Loop on error.

SS4 RESET- Inhibit pass count printout, except every 100 octal passes.

SS4 SET- Ask configuration questions on restart. questions are asked the first time with SS4 SET or reset, also ~~prints pass count~~ for every pass.

SS5 SET- Staticized at startup only.

SS5 SET- TERMINATE, reset - ASR

SS6 SET- Staticized at startup only.

SS5 SET

SS6 SET- Both set will enable CRT at 9600 baud

SS9 SET- Selects diablo 630 compatibility

~~RESET~~ Selects NEC 5515 compatibility

SS15 SET- Requests command mode

The following sense switches operate dynamically:

SSW1,SSW4,& SSW15

3. Command mode input routine details:

To specify to the program alternative choices for the options. Blanks in a command line are ignored. Commands can be abbreviated to one character.

Baud Rate,1-7

The default rate is 1200 baud.

Where 'B' stands for baud rate request where '1-7' corresponds to baud rates. Refer to table below:

STATEMENT	BAUD RATE
B,1	110
B,2	300
B,3	600
B,4	1200
B,5	2400
B,6	4800
B,7	9600

The baud rate of the test routine and the serial printer must be the same.

NEC 5515 INFORMATION

The standard PRIME product is a 96 char. printer. To run the NEC 5515, type an 'A' followed by C/R. This will cause tests 1,2,4,5,6,7,8,9,11 to be run. This combination of tests should be run with the friction off. It should be expected that the vertical positioning on tests 2 and 5 will be inaccurate.

NOTE

The vendor does not guarantee any vertical resolution when the forms tractor is run in reverse.

TEST EXPLANATIONS

Program header will be typed only when starting at '1000 for the first time or subsequent restarts with sense switch 4 set.

LQPT1 consists of the following 11 tests that exercise the special functions of letter quality printers. ~~Switches should be set for 6 LPI and 12 characters per inch, 16 lines for forms lenth, friction off, parity is mark. Duplex is set to full. Impression control on light).~~

NOTE

When using this printer,the friction should normally be off. The vendor does not guarantee vertical placement when the tractor feeds in the reverse direction.

1. A) Tests for the horizontal registration, by printing X and O overstrikes. The X should be centered on the O.

14000

B) This test also exercises the absolute horizontal tabs. A missing O or X indicates failure of the absolute horizontal tabs.

2. Tests the horizontal spacing. Each of the space codes is transmitted between vertical bars.

3. Tests the extended character set of the NEC SPINWRITER. This test prints the 122 on-line characters on the NEC. (This test is only for NEC's with the extended character set.)

4. Prints 96 characters bi-directionally. The LQP is a character printer, not a line printer. Missing characters are most noticeable when the printed line is not rotated.

NOTE

Test 5 requires a red/black ribbon.

5. Prints a line of A's with subscripts and superscripts.

A) This tests the multicolored ribbon by printing the subscript in red.

B) Also tests half line forward feed, and reverse half line feed.

6. Tests the relative vertical tabs by printing a character and then sequentially calling each of the absolute vertical tabs.

7. Tests the margins. This test should result in an O over . X overprint. A missing overprint indicates a failure of the margin feature. Alarm will sound many times.

NOTE

Test 8 will test the sheet feeder on the NEC 5515. For example: Load 8 1/2 by 11 paper. Set the length lever on the sheet feeder to 12. Set the forms length switches to 72. Run test 8.

8. Tests the forms length. Set SSW9 if diablo reset for NEC.

9. A) Sets and tests the relative horizontal tabs.

B) This test down-line sets and down-line clears the relative horizontal tabs at each character position. (The down-line loading takes some time, especially at slow baud rates.) The finished pattern should be O's crossed with X's.

10. (For diablo 630 only) Tests the normal vertical tabs. Test should produce O over X overprint.

11. Excercises each of the form advance increments.

TABLE 3-6: ASCII CODES

OCTAL REP	BINARY	ASCII CODE	HEX REP
200	1 0 0 0 0 0 0 0	NUL	80
201	1 0 0 0 0 0 0 1	SOH	81
202	1 0 0 0 0 0 1 0	STX	82
203	1 0 0 0 0 0 1 1	ETX	83
204	1 0 0 0 0 1 0 0	EOT	84
205	1 0 0 0 0 1 0 1	ENQ	85
206	1 0 0 0 0 1 1 0	ACK	86
207	1 0 0 0 0 1 1 1	BEL	87
210	1 0 0 0 1 0 0 0	BS	88
211	1 0 0 0 1 0 0 1	HT	89
212	1 0 0 0 1 0 1 0	LF	8A
213	1 0 0 0 1 0 1 1	VT	8B
214	1 0 0 0 1 1 0 0	FF	8C
215	1 0 0 0 1 1 0 1	CR	8D
216	1 0 0 0 1 1 1 0	SO	8E
217	1 0 0 0 1 1 1 1	SI	8F
220	1 0 0 1 0 0 0 0	DLE	90
221	1 0 0 1 0 0 0 1	DC1	91
222	1 0 0 1 0 0 1 0	DC2	92
223	1 0 0 1 0 0 1 1	DC3	93
224	1 0 0 1 0 1 0 0	DC4	94
225	1 0 0 1 0 1 0 1	NAK	95
226	1 0 0 1 0 1 1 0	SYN	96
227	1 0 0 1 0 1 1 1	ETB	97
230	1 0 0 1 1 0 0 0	CAN	98
231	1 0 0 1 1 0 0 1	EM	99
232	1 0 0 1 1 0 1 0	SUB	9A
233	1 0 0 1 1 0 1 1	ESC	9B
234	1 0 0 1 1 1 0 0	FS	9C
235	1 0 0 1 1 1 0 1	GS	9D
236	1 0 0 1 1 1 1 0	RS	9E
237	1 0 0 1 1 1 1 1	US	9F
240	1 0 1 0 0 0 0 0	SP	A0
241	1 0 1 0 0 0 0 1	!	A1
242	1 0 1 0 0 0 1 0	"	A2
243	1 0 1 0 0 0 1 1	#	A3
244	1 0 1 0 0 1 0 0	$	A4
245	1 0 1 0 0 1 0 1	%	A5
246	1 0 1 0 0 1 1 0	&	A6
247	1 0 1 0 0 1 1 1	'	A7
250	1 0 1 0 1 0 0 0	(	A8
251	1 0 1 0 1 0 0 1	)	A9
252	1 0 1 0 1 0 1 0	*	AA
253	1 0 1 0 1 0 1 1	+	AB
254	1 0 1 0 1 1 0 0	,	AC
255	1 0 1 0 1 1 0 1	-	AD
256	1 0 1 0 1 1 1 0	.	AE
257	1 0 1 0 1 1 1 1	/	AF
260	1 0 1 1 0 0 0 0	0	B0
261	1 0 1 1 0 0 0 1	1	B1
262	1 0 1 1 0 0 1 0	2	B2
263	1 0 1 1 0 0 1 1	3	B3
264	1 0 1 1 0 1 0 0	4	B4
265	1 0 1 1 0 1 0 1	5	B5
266	1 0 1 1 0 1 1 0	6	B6
267	1 0 1 1 0 1 1 1	7	B7
270	1 0 1 1 1 0 0 0	8	B8
271	1 0 1 1 1 0 0 1	9	B9
272	1 0 1 1 1 0 1 0	:	BA
273	1 0 1 1 1 0 1 1	;	BB
274	1 0 1 1 1 1 0 0	<	BC
275	1 0 1 1 1 1 0 1	=	BD
276	1 0 1 1 1 1 1 0	>	BE
277	1 0 1 1 1 1 1 1	?	BF

OCTAL REP	BINARY	ASCII CODE	HEX REP
300	1 1 0 0 0 0 0 0		C0
301	1 1 0 0 0 0 0 1	A	C1
302	1 1 0 0 0 0 1 0	B	C2
303	1 1 0 0 0 0 1 1	C	C3
304	1 1 0 0 0 1 0 0	D	C4
305	1 1 0 0 0 1 0 1	E	C5
306	1 1 0 0 0 1 1 0	F	C6
307	1 1 0 0 0 1 1 1	G	C7
310	1 1 0 0 1 0 0 0	H	C8
311	1 1 0 0 1 0 0 1	I	C9
312	1 1 0 0 1 0 1 0	J	CA
313	1 1 0 0 1 0 1 1	K	CB
314	1 1 0 0 1 1 0 0	L	CC
315	1 1 0 0 1 1 0 1	M	CD
316	1 1 0 0 1 1 1 0	N	CE
317	1 1 0 0 1 1 1 1	O	CF
320	1 1 0 1 0 0 0 0	P	D0
321	1 1 0 1 0 0 0 1	Q	D1
322	1 1 0 1 0 0 1 0	R	D2
323	1 1 0 1 0 0 1 1	S	D3
324	1 1 0 1 0 1 0 0	T	D4
325	1 1 0 1 0 1 0 1	U	D5
326	1 1 0 1 0 1 1 0	V	D6
327	1 1 0 1 0 1 1 1	W	D7
330	1 1 0 1 1 0 0 0	X	D8
331	1 1 0 1 1 0 0 1	Y	D9
332	1 1 0 1 1 0 1 0	Z	DA
333	1 1 0 1 1 0 1 1	[	DB
334	1 1 0 1 1 1 0 0	\	DC
335	1 1 0 1 1 1 0 1	]	D5
336	1 1 0 1 1 1 1 0		DE
337	1 1 0 1 1 1 1 1	-	DF
340	1 1 1 0 0 0 0 0		E0
341	1 1 1 0 0 0 0 1	a	E1
342	1 1 1 0 0 0 1 0	b	E2
343	1 1 1 0 0 0 1 1	c	E3
344	1 1 1 0 0 1 0 0	d	E4
345	1 1 1 0 0 1 0 1	e	E5
346	1 1 1 0 0 1 1 0	f	E6
347	1 1 1 0 0 1 1 1	g	E7
350	1 1 1 0 1 0 0 0	h	E8
351	1 1 1 0 1 0 0 1	i	E9
352	1 1 1 0 1 0 1 0	j	EA
353	1 1 1 0 1 0 1 1	k	EB
354	1 1 1 0 1 1 0 0	l	EC
355	1 1 1 0 1 1 0 1	m	ED
356	1 1 1 0 1 1 1 0	n	EE
357	1 1 1 0 1 1 1 1	o	EF
360	1 1 1 1 0 0 0 0	p	F0
361	1 1 1 1 0 0 0 1	q	F1
362	1 1 1 1 0 0 1 0	r	F2
363	1 1 1 1 0 0 1 1	s	F3
364	1 1 1 1 0 1 0 0	t	F4
365	1 1 1 1 0 1 0 1	u	F5
366	1 1 1 1 0 1 1 0	v	F6
367	1 1 1 1 0 1 1 1	w	F7
370	1 1 1 1 1 0 0 0	x	F8
371	1 1 1 1 1 0 0 1	y	F9
372	1 1 1 1 1 0 1 0	z	FA
373	1 1 1 1 1 0 1 1	{	FB
374	1 1 1 1 1 1 0 0	|	FC
375	1 1 1 1 1 1 0 1	}	FD
376	1 1 1 1 1 1 1 0		FE
377	1 1 1 1 1 1 1 1	DEL	FF

CHAPTER 4
PRINCIPLES OF OPERATION

INTRODUCTION

This chapter provides service personnel with SPINWRITER printer opertation sequence and circuit information.

The model 5515 SPINWRITER is a high-performance, serial, full character printer. An 8080A micro-processor-based control system sequences the printer functions.

The SPINWRITER logic (Figure 4-3, SYSTEM BLOCK DIAGRAM) consists of the Micro-processor Control System (Processor Board), Servo Motor Control (Servo Board), Power Amplifier (Driver Board), Operator Panel (Control Panel), and a power supply. Some models (not offered by PRIME) also have a keyboard, and keyboard logic.

PRINTER MECHANICAL OPERATION

The mechanical operation of the SPINWRITER printers is similar to the office typewriter. A character font is pushed by a hammer against an inked ribbon. The ribbon, in turn, contacts the paper, transferring the image to the paper. The used portion of ribbon is advanced prior to the printing of the next character to insure a clear image. On completion of a line of printing, the paper advances to a new line position as determined by commands sent to the printer electronics.

PAPER FEED MECHANISMS

A typewriter style platen (refer to Figure 4-1) is used to feed paper and position the copy vertically. The printer (as sold by PRIME) is equipped to operate with either continous fed forms or automatically fed cut-sheet paper. If the continious fed form is used the printer will have a Tractor Assembly attached. The Tractor Assembly (instead of the platen) is used to move paper. Tractor motion is supplied using a gear arrangement with the platen.

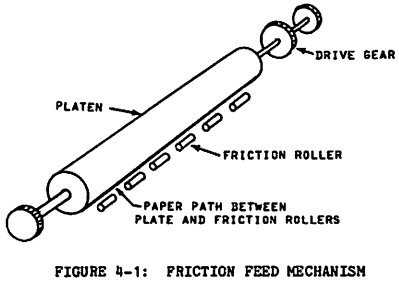


FIGURE 4-1: FRICTION FEED MECHANISM

When using cut sheets, the Cut-Sheet Feeder is installed, and the the Tractor Assembly is removed. A stepping motor, mounted on the right side of the printer mechanism is used to drive the platen axial shaft. External commands, operating through the printer control electronics, control the stepping motor to move paper in increments of 1/48th inch.

PRINTING MECHANISMS

The fonts used to print the characters are molded into a lightweight plastic print thimble. The print thimble (refer to Figure 4-2) contains 64 fingers. Each finger contains two characters one above the other. Thus, each thimble can contain up to 128 different characters. The print thimble rotates in a horizontal plane up to 180 degrees in either direction, parallel to the axis of the platen. A rotary solenoid, the vertical lift coil, is used to select which of the two characters on a finger will be printed by moving the thimble in a vertical direction (up or down). A servo motor is used to rotate the print thimble in its horizontal plane. The motor has a feedback circuit which is used by the printer electronics to keep track of the thimble velocity and direction of rotation. A solenoid operated print hammer is positioned in the center of the thimble at a 90 degree angle to the platen axial shaft. When the proper character is aligned for printing, a current pulse is applied to the hammer which then strikes the plastic finger of the print thimble, driving the finger against the ribbon and paper.

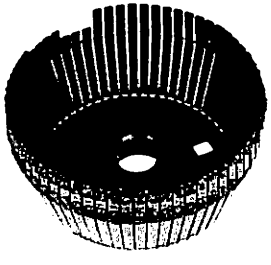


FIGURE 4-2: PRINT THIMBLE

CARRIAGE MECHANISMS

The print thimble, print hammer, rotate servo motor and vertical lift coil are mounted on a mechanical assembly known as the print carriage assembly (refer to Figure 4-4). Also mounted on the print carriage are the ribbon cartridge, a stepping motor to drive the ribbon feed, a magnet to lift the ribbon for color change and an end of ribbon sensor. The carriage assembly travels the width of the printer chassis on two guide rails, which are parallel to the axis of the platen.

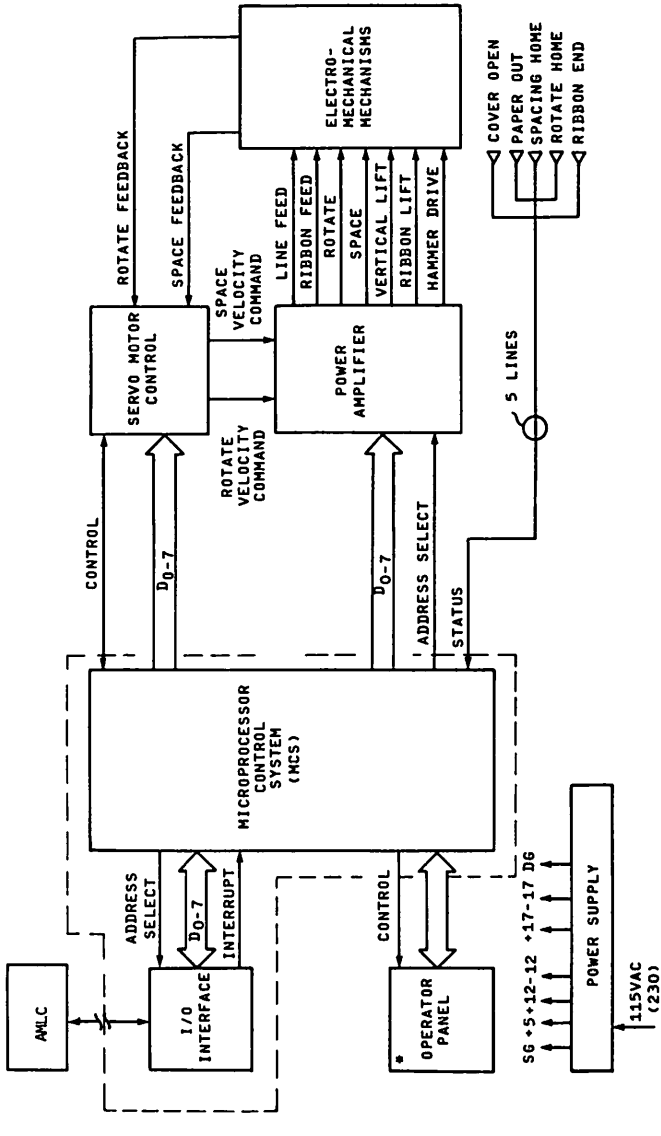


FIGURE 4-3: SPINWRITER BLOCK DIAGRAM

A flexible cable is used to transmit commands from the Micro-processor Control System to the print carriage motors and solenoids. A magnetic sensor mounted underneath the print carriage is used to sense the extreme left or right position. The left sensor is also used to detect print position zero. The carriage is moved column by column or a specified number of columns entirely by the rotation of a pulley driven by a servo motor. Control signals from the micro-processor (via the Servo drive board) drive the servo motor in response to external commands. The angle of motor rotation is precisely detected by a position transducer mounted on the servo motor shaft. This transducer is designed to allow for print carriage movement increments of 1/120-inch.

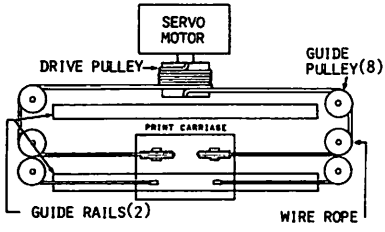


FIGURE 1-4 PRINT CARRIAGE

FIGURE 4-4: PRINT CARRIAGE

RIBBON MECHANISMS

Ribbon feed and ribbon lift are controlled by individual subsystems. A solenoid is used to lift the ribbon cartridge platform into the desired color position, (up or down). A stepper motor is used to move the ribbon prior to printing a character.

SYSTEM BLOCK DIAGRAM DISCUSSION - (FIGURE 4-1)

MICRO-PROCESSOR CONTROL SYSTEM

The Micro-processor Control System (MCS) is the primary printer control unit. All control, and data signals pass through the Micro-processor Control System. Received data is interpreted as print characters or control commands. Print characters are stored in the Micro-processor Control System memory for printing. Control commands are executed by the Micro-processor Control System as they are received.

Control and Status Operation

Example of control commands include paper feed and print carriage motion. In addition, the Micro-processor Control System monitors various printer functions to ensure proper operation. For example; if the print carriage exceeds its left or right-most limit of travel or if the print carriage fails to respond to a motion command, a Drive Lock command is issued which shuts off power to the servo mechanisms. Other printer status checks include paper out, cover open, ribbon end, rotate home and spacing home.

Data Bus, Address Lines and Interlock

The internal data path of the printer is an 8-bit bidirectional data bus. This data bus is common to the Micro-processor, Servo Motor Control, and Power Amplifier sections. Separate address select lines generated by the Micro-processor Control System determine access to the data bus. The data bus is used to:

1. Carry control information from the Micro-processor to the Servo Motor and Power Amplifier circuits.

2. Carry status information from the Servo Motor and Power Amplifier to the Micro-processor.

3. Carry I/O data from the Micro-processor to the I/O Interface.

The MCS controls the address select circuits to activate and inhibit specific printer functions. For example, during printing, the paper feed, print thimble, and ribbon feed address select lines are inactive and their associated mechanical functions cannot occur. During paper feed, the print hammer control mechanism is inhibited. This logical interlock controlled by the Micro-processor Control System prevents damage to the printer mechanisms and allows for optimum printing, spacing, paper feed, and ribbon feed operations.

SERVO CONTROL CIRCUITS

The Servo Motor Control circuit is used to convert Micro-processor Control System digital commands into analog drive voltages. The servo motor control has two sections; print timble rotation and print carriage spacing. Since both sections are functionally alike only the rotate circuits are described in detail. The digital data from the Micro-processor Control System to the rotate circuit contains print thimble velocity and directional information. The circuit operates in two modes; velocity and position. As the print thimble rotates, a count pulse is generated for each character position of rotation. As the print thimble approaches the print postion, a Micro-processor Control System command is sent to hold the present position while the servo system enters the position mode. In the position mode, the thimble's position is maintained by monitoring the feedback signal from the rotate servo motor without Micro-processor Control System intervention. The power amplifier is used to provide sufficient voltage and current to operate the printer's various motors and solenoids. The rotate and space velocity command inputs to the power amplifier are analog voltages. The remainder of the inputs are from the data bus and are logic levels which turn amplifier circuits on or off.

POWER SUPPLY CIRCUIT

The power supply provides the required dc voltages for the printer electronics. The power supply consists of an inverter/control unit with permanently mounted circuit boards, and a serparate plug-in regulator PCB. The inverter/control unit provides a source of unregulated dc voltages by rectifying the ac input voltage. The voltage regulator provides highly stabilized dc voltages for use by the printer electronics.

OPERTATOR CONTROL PANEL LOGIC

Refer to Figure 4-1. The operator control panel logic accesses the bi-directional data bus and allows the operator to select various printer functions; i.e. number of lines per inch, number of characters per inch, forms length in lines, and setting the self-test mode.

PRINTED CIRCUIT BOARD OPERATION

PROCESSOR/INTERFACE BOARD - (FIGURE 4-5)

The processor board consists of two major sections: controller interface circuitry (I/O interface) and the Micro-processor Control System (MCS). The interface circuitry matches AMLC data and control signals, to the SPINWRITER, while the micro-processor circuitry provides system control for all printer operations via the machine control Input/Output (I/O) ports.

The micro-processor portion of the processor board controls all of the printer functions including selection, status, data transfers, and timing. These functions are carried out by an internal firmware program (stored in ROM) that periodically scans the operator control panel, controller interface, and performs all necessary functions.

Feedback signals from printer electromechanical units are also stored in temporary memory for use by the main instruction program. Control signals to printer subassemblies and resulting feedback signals are routed via several I/O ports. The data transmission process is serviced periodically by the controller. The printer firmware instructions located in memory initiate and control all these operations.

Micro-processor Memory Section

The memory on the processor board consists of eight 1K x 8 Read Only Memories (ROM) and 2 pair of 256 x 4 Random Access Memory (RAM). The Read Only Memory (ROM) contains the firmware program. The Random Access Memory is used to temporarily store incoming data from the I/O interface. Mechanical position (of the subassemblies), and status information from the Machine Control I/O ports are also controlled by the micro-processor. The micro-processor controls the machine control I/O Port and the I/O interface by reading out and executing micro-processor instructions stored in Read Only Memory (ROM). The proper execution of these firmware instructions by the micro-processor enables the printer to receive data, convert data into the printer's internal print code and generate control commands to the printer's mechanical units.

Machine Control I/O Ports - (FIGURE 4-6)

The Programmable Peripheral Interface (PPI) portion of the machine control I/O port transfers control commands to/from the printer mechanisms. These control commands include velocity and direction of print thimble rotation, velocity and direction of carriage spacing, print thimble plane, length of paper feed, ribbon feed, and hammer impression commands.

The Programmable Interrupt Controller portion is used to notify the micro-processor when a peripheral device or servo system wants program attention.

The Event/Counter (Watch Dog) Timer informs the micro-processor that a particular event has or

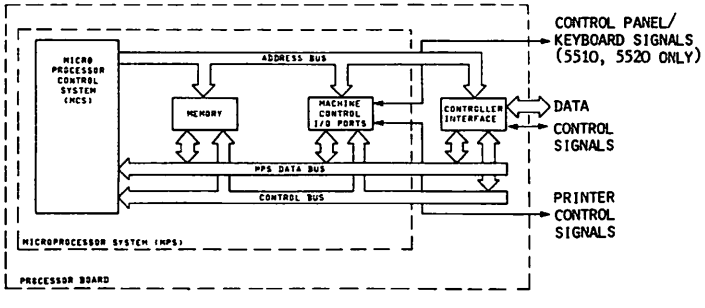


FIGURE 4-5: PROCESSOR/INTERFACE BLOCK DIAGRAM

has not been completed in a specified time frame. For example, at the start of a space operation, the space timer is loaded with a time interval measured in milliseconds. A start command is issued to the carriage to initiate spacing. If the specified space time expires before carriage motion stops, the timer will cause an interrupt to the micro-processor system indicating a carriage malfunction or a physical restriction. The timer receives timing commands for the rotate and space functions.

Basic Micro-processor Operation

The main functions Micro-processor are to periodically scan the control panel data port, and perform the output commands to the operator control panel indicators and I/O interface. When an input signal is received from the AMLC (via the I/O interface) the firmware program is interrupted by the Programmable Interrupt Controller and jumps to an interrupt service subroutine. During this service subroutine, the input data is stored in temporary buffer storage (RAM). The subroutine returns to the location in the main routine where it was before it was interrupted and continues scanning.

The input data is received by the interrupt subroutine and processed by the main routine. The Micro-processor firmware converts the received data in the temporary buffer into internal codes. This allows the Micro-processor to make logical decisions concerning character selection, spacing, line feed, etc. For example, if the data is to print an "A", the micro-processor compares the type and position of the character to be printed to the current position of the carriage assembly and print thimble stored in RAM. The micro-processor calculates:

1. The shortest direction and distance to be moved for print thimble rotation.

2. The vertical print thimble plane to be selected.

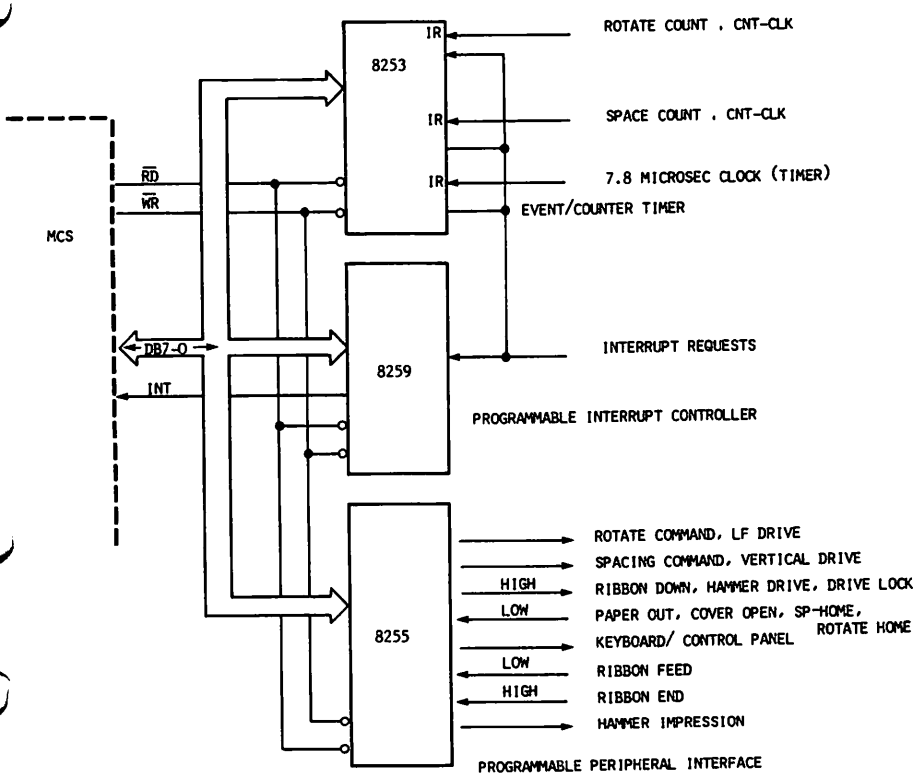


FIGURE 4-6: MACHINE CONTROL I/O PORTS

3. Any spacing or line feed required to print the new character.

The micro-processor outputs the applicable commands to the Servo board via the Machine Control I/O Ports. The the Servo Board and the Driver Board drive the mechanical parts in accordance with the information from the I/O Ports.

The feedback signals from any mechanical part in operation initialize the event counters of the I/O Ports. When the mechanical movement stops, the I/O port sends an interrupt to the micro-processor.

Micro-processor Interface Section

This serial I/O interface is also implemented and contained on the Processor board.

This I/O interface employs an Universal Synchronus Asynchronous Receiver Transmitter (USART) that is controlled by the firmware. The Programmable Peripheral Interface (PPI) outputs the switch selected baud rate (from the control panel) to the baud rate generator. Received serial data is converted, by the USART, into 8 bit parrallel data. Presence of serial data is signaled, from the USART, to the micro-processor system via an interrupt. The Micro-processor monitors the incoming data for control characters. If the data is a control character it is acted upon immediately. Data character's are stored (upto 256 bytes or charcaters) in Random Access Memory (RAM).

Control (XON/XOFF protocol) information from the micro-processor in a parallel format is converted to serial format for transmission to the AMLC. The data transmission process is serviced periodically under firmware control. The USART signals the micro-processor when it has completely received a character and requires service. Control of all of the handshaking signals required to operate over data communications lines is also handled by the USART. The USART also provides data buffering, code conversion, and formatting processes for both received data and data transmitted.

Xon/Xoff Protocol

The XON/XOFF protocol is enabled by setting DIP switch #3, located on the Operator Control Panel, ON. The SPINWRITER transmits an XOFF code to the CPU when its receive buffer is 7/8's full of when certain error conditions exist. When the condition has been corrected an XON is then sent to the CPU. The XOFF code is transmitted under the following conditions:

1. RAM buffer 7/8 full (approximately 30 characters from the capacity of 256 characters).
2. Paper out.
3. Cover open.
4. Ribbon end (multistrike only)

The XON code is transmitted under the following conditions:

1. RAM buffer available (approximatly 100 character from the bottom of the buffer).
2. Paper out corrected and ALARM condition has been reset.
3. Cover open condition has been corrected.
4. Ribbon is replaced and ALARM indication has been reset.

SERVO BOARD - (FIGURE 4-7)

General Description

The servo board logic circuits (FIGURE 4-7) receives position and control information from the micro-processor to control the carriage drive (spacing) servomotor, the print thimble (rotate) servomotor and the vertical position (print thimble lift) coil.

The rotate and space servomotors are functionally identical. The rotate servomotor rotates the print thimble to a new character postion, and the spacing servomotor moves the print carriage to a new horizontal print position. The following circuit theory deals with the rotate functions. This theory can be applied to spacing servo systems circuits.

Print Servomotor - Rotate Velocity Control

The rotate servo control circuit receives velocity (RTVELA1,B1,C1) direction of rotation (RTXXCW0,RTXCCW0) commands from the micro-processor system. Two feedback signals, RTOAPOS and RTOBPOS developed by the velocity detector, inform servo control of the motor's rotational speed and direction. The spacing servo control circuit receives similar input signals and operates in much the same manner as the rotate servo control circuit. Spacing servo control circuit differences are contrasted in the Spacing Servo Control Circuit section.

The micro-processor and feedback commands are applied to a summing amplifier. The resultant output of the summing amplifier is used to accelerate and decelerate the servomotor.

In addition, one count pulse is developed every increment of rotation (one character position or one space position) and is forwarded to the micro-processor.

Print Thimble Servo Motor - Position Control

When the servomotor reaches a point 1/8th position from the specified stop position, the direction command from the micro-processor is turned off. As a result, the position mode is entered. The position signal is applied to the summing amplifier in place of the velocity command voltage.

In the position mode, the position signal, is amplified by the summing amplifier and used as the error voltage signal. The motor will continue to rotate until the signal becomes zero.

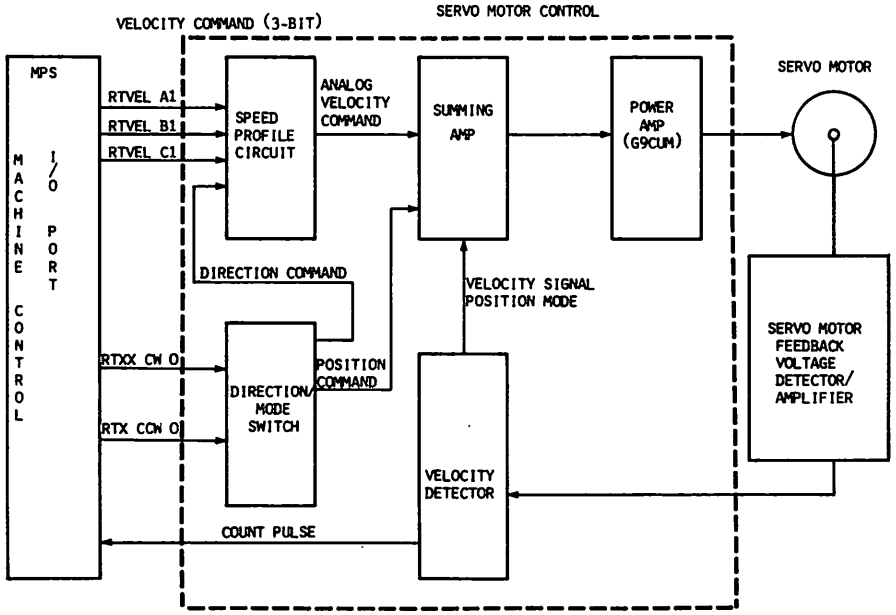


FIGURE 4-7: SERVO MOTOR CONTROL BLOCK DIAGRAM

Spacing Servo Control Circuit

The spacing servo control and rotate servo control circuits are nearly identical in operational principle. However, they differ slightly in the positioning mode. To provide for the required number of spaces, the number of motor stop positions in the spacing servo control circuit is double that of the rotate servo control circuit. To obtain double the number of motor stop positions, the following circuits on the spacing servo control system differ from those in the rotate servo control system: direction and mode selector, and count pulse circuit.

Print Thimble Lift Coil

Feedback signals from the lift coil are used to produce a sense signal which is fed back to the micro-processor control system.

DRIVER BOARD

The driver board contains the power amplifiers which supply print drive voltages to the spacing and rotate motors, and the vertical print thimble coil. The driver board also contains decoding logic and drive circuits to control the remaining printer mechanisms: the line feed motor, hammer coil, ribbon color change coil, and ribbon feed motor.

Driver Board Functions

The driver circuits provide voltage and current for the various printer motors and solenoides. The driver board includes circuitry for the following functions:

- Rotate and Space Servomotors
- Print Thimble Vertical Lift Coil
- Print Hammer Drive
- Ribbon Color Change Magnet
- Ribbon Drive Motor
- Paper Feed Drive Motor
- Driver Interlock

Servo Drivers - (FIGURE 4-8)

There are two kinds of servo drivers, space and rotate. The operation of both drivers is identical. This explanation deals with the theory of how they operate.

The servo driver receives its direction and velocity voltage in the form of an error voltage from the Servo Control Board. The error voltage is used to determine which section of the drive amplifier gets turned on. If the error voltage is positive, the positive section of the amplifier gets turned on, driving the servo motor in a clockwise direction.

When the error voltage is negative, the negative section gets turned on, driving the servo motor in a counter-clockwise direction.

The turning of the servo motor creates a positive, or negative voltage dependent on the direction of rotation. This feedback voltage is directly proportional to the speed of the servo motor, (i.e. the faster the motor turns the higher the voltage). This feedback voltage is used to limit the amount of error voltage input into the Servo Driver.

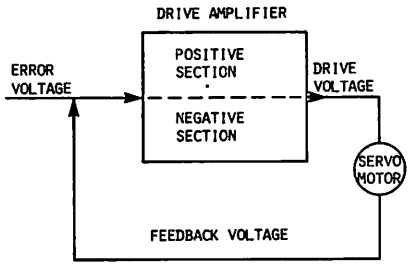


FIGURE 4-8: SERVO DRIVER

Vertical Driver - (FIGURE 4-9)

The Vertical Driver is used to control the position of the print thimble via the vertical lift magnet. The stepper type vertical lift magnet positions the print thimble in either the up or down position.

The lift control signals (directly from the processor board) are converted to drive signals on the Driver Board. These drive signals are sent to both the Vertical Lift Magnet and the Servo Control Board. When the Vertical Lift Magnet is in position a voltage is generated. This voltage is sent to the Servo Control Board, where it is compared with the original drive signals. The comparison generates a sense signal which allows the processor to know that the print thimble has moved to its correct location.

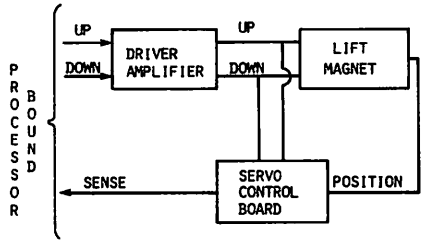


FIGURE 4-9: VERTICAL DRIVER

Hammer Driver - (FIGURE 4-10)

When a character is to be printed, the character is converted to a code. This code specifies the physical location of the character on the print thimble. The code is also used to determine which of four possible groups the character belongs to. Each of the four types indicates the surface area of the character to be printed.

TABLE 4-1: SELECTION OF HAMMER IMPRESSION LEVEL

IMPRESSION SWITCH \ TYPE GROUP	a	b	c	d
HIGH	7	6	5	3
MEDIUM	6	5	4	2
LOW	5	4	3	1

The type group and the Impression Level Switch, from the Operator Control Panel, are then combined to determine which of 7 levels will be used to fire the hammer. Refer to TABLE 4-2. Each level represents the number of seconds the hammer will be fired, and the current that is used to fire it. Refer to Table 4-2.

TABLE 4-2: HAMMER IMPRESSION LEVEL PULSE WIDTH

HAMMER IMPRESSION LEVEL	7	6	5	4	3	2	1
HAMDRV PULSE (MS)	2.0			1.6			
HAMMER CURRENT (A)	3.3	2.8	2.55	3.0	2.8	2.55	2.4

Refer to FIGURE 4-10. The hammer driver signal is run through a driver, and switch, before firing the hammer. While the hammer driver signal is firing the hammer, the reference level for the character to be printed is being generated. The reference level is run to a comparitor. Once the hammer is fired the signal is run through a detector, to the comparitor. When the hammer driver signal reaches the reference level, a signal is generated by the comparitor which turns off the switch, in the hammer driver circuit, which stops the hammer from firing.

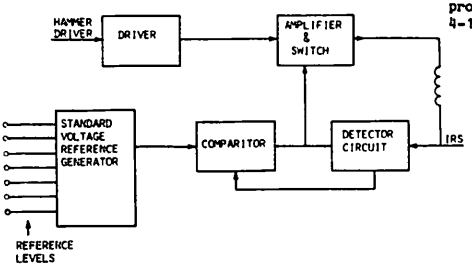


FIGURE 4-10: HAMMER DRIVER

Ribbon Color Change Magnet Driver - (FIGURE 4-11)

The ribbon change magnet driver controls the position of the ribbon (up or down) via commands from the Micro-processor Control System. When the solenoid is energized, the ribbon is moved to a down, or red position (true only when using two-color ribbons). The solenoid in the up, or normal position, causes the black section of the ribbon to be used.

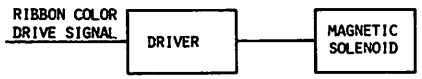
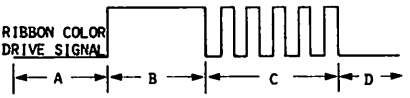


FIGURE 4-11: RIBBON COLOR CHANGE DRIVER

Refer to the Timing Chart and block diagram for this explanation. The initial ribbon color drive signal from the Micro-processor Control System forces the magnet solenoid in a down position (B). The drive signal is then pulsed to keep the ribbon down (C). When the signal stops (D), spring tension returns the solenoid to the upper, or black position.



A - RIBBON IN BLACK POSITION
B - RIBBON DRIVES TO RED POSITION
C - RIBBON HELD IN RED POSITION
D - RIBBON RETURNS TO BLACK POSITION, VIS SPRING TENSION

FIGURE 4-12: RIBBON COLOR CHANGE TIMING CHART

Ribbon Drive

The ribbon drive circuit provides the necessary curent to control the stepper-type ribbon drive motor, which has two stator windings 90 degrees apart. These windings are center-tapped to provide four smaller windings, as shown in Figure 4-12.

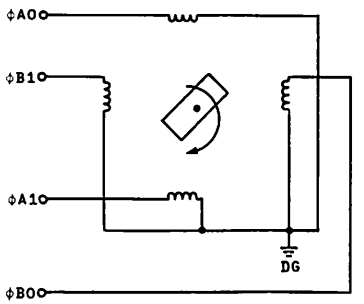


FIGURE 4-13: RIBBON DRIVE MOTOR WINDINGS

The motor windings are energized by four signals whose timing relationships are shown in Figure 4-14. Only to windings will be energized at one time and the windings will always be 90 degrees apart. The resultant magnetic field produced by the current flow through the stator windings will cause the rotor to rotate 90 degrees clockwise.

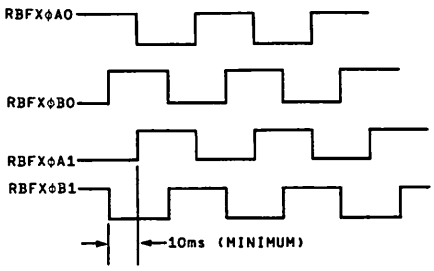


FIGURE 4-14: RIBBON FEED DRIVE TIMING

Paper Feed Driver

The paper feed driver circuit provides the necessary current to operate the paper feed drive motor. This motor employs two center-tapped field windings and an armature. The field windings are arranged (FIGURE 4-15) in twelve groups of four small windings. This arrangement of field windings produces 48 positions at which the armature can align itself. One revolution of the motor armature is equal to 48 pitches, or one inch of paper travel at the platen.

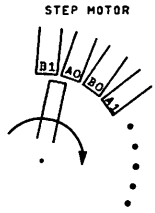


FIGURE 4-15: PAPER FEED MOTOR FIELD WINDINGS

Driver Interlock

The drive lock circuit is used to turn off various power driver circuits to prevent printer operation if a fault condition should occur. The drive interlock circuit will be active:

1. Until the dc power has been established after initial ac power on.
2. 21 milliseconds after ac power is shut off, reset signal goes low.
3. If the dc voltages (+12V, -12V, +5V) exceed 20 % of their rated value.
4. If the micro-processor control system has detected a fault condition and has enabled DRVLOCK to a high level.

OPERATOR CONTROL PANEL LOGIC BOARD

This logic board provides access to the processor for selection of impression, parity, speed, line feed, spacing, form length, and form feed commands.

The processor board firmware program monitors data from the operator controls by scanning the various switch positions.

POWER SUPPLY

The power supply provides five dc regulated output voltages: +5V, ±12V, ±17V. It is a compact, lightweight, built-in power supply containing three printed circuit boards. The power supply consists of an AC voltage regualtor and a DC voltage regulator. The switching and control circuits of the AC regulator provide input current to a constant voltage transformer (CVT). The regulated DC outputs are derived from stepped-down, regulated AC voltage supplied by the CVT.

MECHANICAL UNITS

This section describes the function and construction of the printer carriage mechanism, spacing mechnism, and paper feed mechanism.

CARRIAGE MECHANISM

Print Thimble

The printer is equipped with a print thimble which is illustrated in Figure 4-3. For character selection, the print thimble is rotated bi-directionally and/or is moved vertically to the selected character. To print the character, the print hammer is actuated to impinge the print thimble character against the ribbon and onto the paper wrapped around the platen.

The print thimble has 64 fingers. Two characters are arranged vertically on each finger, allowing for a total of 128 characters on a print thmble if required. Five of the fingers located at or near the home position are shortened, thus lacking the top character space or part of the bottom character space. This provides visibility of the last characters printed. A square sequence hole at the bottom of the print thimble accepts the pivot insert from the slide sleeve on which the print thimble is mounted. The rotate motor drives the slide sleeve assembly which in turn rotates the print thimble to the desired character. The sequence hole also aids in determining the correct relative position of the print thimble with respect to the rotate motor.

Print Hammer

The plunger-type print hammer is mounted in a housing and is equipped with a magnet. When energized by the action of a solenoid driver, the hammer is driven in free flight and strikes the selected print thimble character.

The recoil force and the magnet together reseat the hammer to its original position. The print hammer is installed so that its action strikes the inside wall of the print thimble. However, the arrangement allows for easy replacement of the print thimble when required. The hammer assembly is secured to the hammer cover assembly, as shown in Figure 4-16. Manipulation of the lock lever allows the hammer cover assembly to be pivoted away from the print position. This allows access to the print thimble for replacement. The shoulder screw and the Phillips screw on the hammer fix the print hammer to the hammer cover, and are used to adjust the print hammer angle. The position plate provides for simple adjustment.

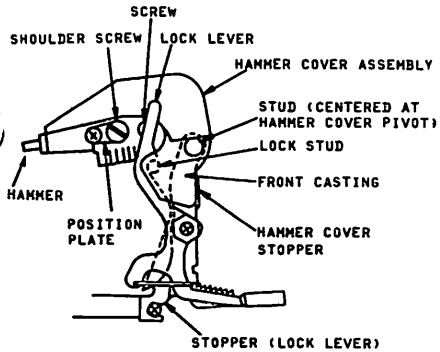


FIGURE 4-16: PRINT HAMMER ASSEMBLY

A card holder is used as an auxiliary device to keep the paper and ribbon correctly positioned during hammer operation. This is illustrated in Figure 4-17. The card holder is mounted at the front part of the carriage and holds the paper securely against the platen. The card holder bracket has two arms that allow the ribbon to pass through while maintaining clearance between the ribbon and print thimble. In addition, the card holder is an aid to indicate the present printing position. It also guides the paper during the paper load operation.

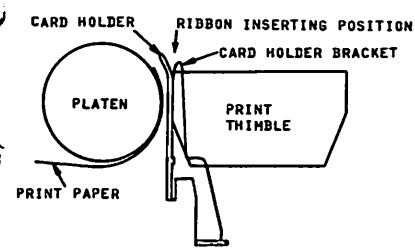
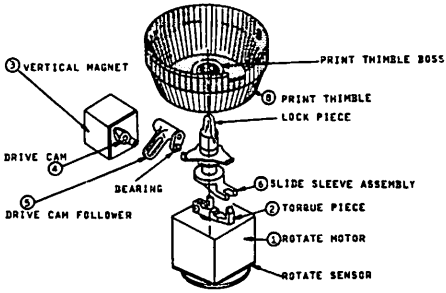


FIGURE 4-17: CARD HOLDER MOUNTING

Character Selection

To accomplish character selection, mechanical movement is performed in both rotational and vertical directions. To accomplish this function, a servomotor and a magnet are used in the carriage assembly. Figure 4-18 illustrates the character selection assembly.



OPERATIONAL FLOWS

ROTATE: 1 → 2 → 6 → 7 → 8

VERTICAL: 3 → 4 → 5 → 6 → 7 → 8

FIGURE 4-18: CHARACTER SELECTION ASSEMBLY

Print Thimble Mounting

The print thimble is installed onto the slide sleeve assembly and secured with the lock piece as shown in Figure 4-18. The lock piece is made of an elastic material and has an elongated hole. A pin is installed through the hole and prevents the lock piece from being pulled out. With the print thimble installed, the lock piece lies horizontally across the cut portion of the slide sleeve and presses against the print thimble boss, thus securing the thimble in place. When the print thimble is to be removed, the lock piece is pulled up and raised to the vertical position. The slide sleeve assembly has three arms spaced 120 degrees apart. The bottom of the print thimble rests against these arms. As described previously, one of the arms has pivot which fits into the square hole on the bottom of the print thimble. This is the means by which the rotate motor imparts torque through the slide sleeve assembly to rotate the print thimble.

Rotate Selection

The rotate motor selects one of the 64 positions located on a circle at even intervals. The motor rotation is directly transmitted to the slide sleeve through the torque piece mounted on the motor shaft. With the set screw loosened, the torque piece and motor shaft are disengaged. This allows the motor position to be set to correspond with the print thimble character position. The angle of motor rotation is detected by a position transducer mounted on a shaft at the bottom of the rotate motor.

The transducer, shown in Figure 4-19, consists of a rotor and a fixed stator. Position information from the transducer is transformer coupled to the servo board. Home position is detected by a magnetic pick-up coil located under the position transducer rotor. The home position signal results when a magnet mounted on the rotor board passes over the pick-up coil.

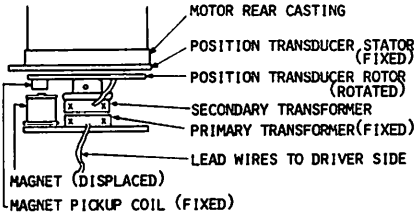


FIGURE 4-19: ROTATE POSITION TRANSDUCER

Vertical Selection

Refer to Figure 4-18. A rotary type vertical magnet selects one of two print thimble positions, (up or down) and latches the thimble into position. A drive cam (4) is secured onto the vertical magnet shaft which rotates freely. A bearing at the end of the drive cam fits inside an elongated hole in the drive cam follower (5). The drive cam follower is supported by a stud and rotates freely around this stud. This provides a stud-centered rotation which is restricted by the drive cam movement. A bearing installed at the end of the drive cam follower engages a fitting on the slide sleeve (6). The slide sleeve is inserted into the rotate motor shaft and moves upward or downward dependent upon the cam follower displacement. Since the slide sleeve and print thimble are fixed, the print thimble will be moved up or down according to the vertical magnet rotation.

Ribbon Cartridge/Ribbon Feed

The ribbon cartridge houses 16 meters of endless fabric ribbon (red/black or black). Two rubber rollers in the cartridge wind the ribbon into the cartridge and move it out of the ribbon outlet as shown in Figure 4-20. One of these rubber rollers has a knob outside the cartridge housing to enable manual ribbon feed. When using a multi-strike ribbon, the ribbon is passes through a non-contact switch groove so that the ribbon end can be detected. When this occurs, the printer stops printing characters. Two pins on the bottom of the ribbon cartridge fit into two positioning holes in the ribbon base. The cartridge is held in place by two plastic locking tabs, one on each side of the cartridge base.

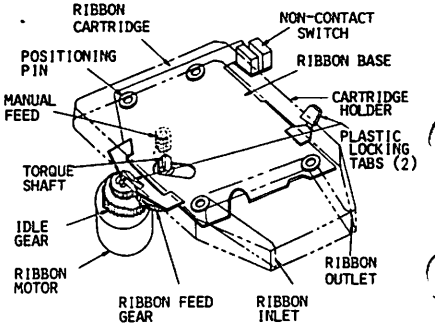


FIGURE 4-20: RIBBON CARTRIDGE

The ribbon feed mechanism transfers ribbon motor rotation to the cartridge rubber rollers. An idle gear on the ribbon motor assembly engages the ribbon feed gear. This movement is transferred to the ribbon cartridge torque shaft which engages the rubber rollers for ribbon feed.

Ribbon Change Mechanism

The ribbon change mechanism, Figure 4-21, positions the ribbon cartridge base to red, black, or character-visible positions. The base is shifted to any one of these positions dependent on the print color selected and visibility setting. The ribbon cartridge is loaded onto the base with the red ribbon half up, the black ribbn half down. The base is usually held in the up or black position by spring tension. When the red position is selected, a solenoid on the base assembly is energized pulling the base down to allow printing in red.

For character visibility position, the ribbon mode slider, located at the front end of the ribbon base (accessible when the ribbon cartridge is removed), is moved to the black position. This keeps the ribbon base in the down position and prevents the ribbon from covering the last character printed. This position does not allow the printing of red and black characters. Characters will print all black or all red, depending on the type of ribbon used.

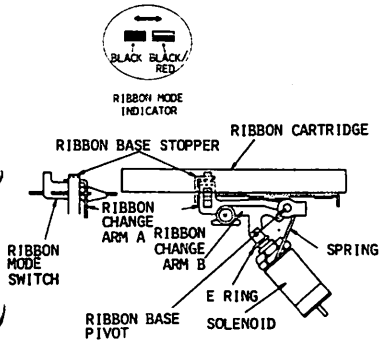


FIGURE 4-21: RIBBON CHANGE MECHANISM

Guide System

The guide system guides the horizontal movement of the carriage mechanism within the printer chassis. The system consists of a guide casting assembly with six rollers and two guide rails, front and rear. In addition, two hooks and two grooved pulleys are attached to the guide casting assembly to accommodate the wire rope. Four of the rollers are arranged on top of the front rails in two pairs with each pair arranged at a 45-degree angle to the left and right of the carriage assembly. The remaining two rollers are mounted beneath the angled pairs, and traverse the bottom side of the front rail. The bottom rollers are under spring tension.

Two rollers are mounted on the rotate motor assembly. These rollers traverse the rear guide rail - one on top and the other on bottom. The bottom roller is under spring tension. The carriage assembly is secured to the guide casting with three screws, thus allowing easy removal of the carriage assembly, leaving the wire drive ropes and guide casting assembly intact.

SPACING MECHANISM

The spacing mechanism controls the horizontal movement of the carriage. This unit, shown in Figure 4-22, consits of the spacing motor, wire rope system, and guide pulleys. The initial carriage position, left and right carriage travel limits are controlled by the emergency (EM) plates shown in Figure 4-22.

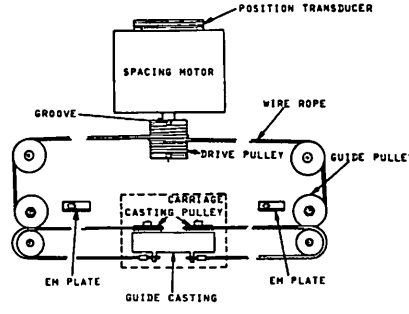


FIGURE 4-22: SPACING MECHANISM

Wire Rope System

The carriage is moved column by column or a specific number of columns on command of the spacing motor. Column movement is transmitted to the carriage assemby through the wire rope system. There are two wire ropes, right side and left side. The routing of each rope is identical, except that the left rope uses pulleys on the left side of the printer, and the right rope uses pulleys on the right side of the printer. Each rope is routed as follows. One end is hooked into a groove on the spacing motor drive pulley. The wire is wrapped around the pulley, and passed through two guide pulleys to a casting pulley located on the carriage assembly. From the casting pulley the rope is passed through a third guide pulley, and the end is secured to the guide casting assembly. The wire ropes are adjusted to the proper tension by an adjusting screw located on the left pulley bracket on the left side of the printer. This is illustrated in Figure 4-23.

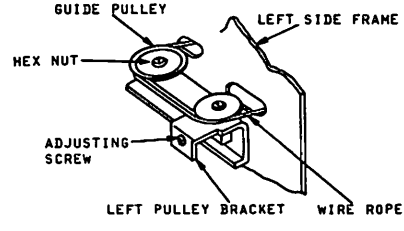


FIGURE 4-23: WIRE ROPE ADJUSTMENT

Emergency (EM) And Initialize Functions

The emergency (EM) function causes the spacing motor to stop when the carriage exceeds the printing area. This prevents the carriage from hitting the frame and possibly being damaged. There are two EM plates mounted on the left and right sides of the bottom of the frame under the carriage. A magnetic detection element is mounted under the carriage assemby. When the left or right EM plate passes through the magnetic element (Figure 4-24), the detection output is sent to the micro-processor which issus a DVLOCK command to shut off the drive current to the spacing motor.

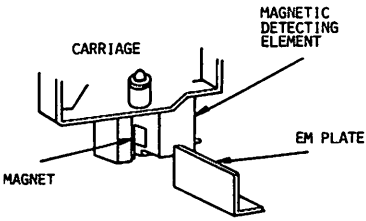


FIGURE 4-24: SPACING MAGNETIC DETECTION ELEMENT

The initialize function determines the first printing position. The left EM plate passing through the magnetic detection element detects the carriage position when the printer is turned on. This causes the carriage to move to the first printing position as specified by the control unit. Once the first printing position is set, it will not change unless it is reset or the printer is powered OFF.

Spacing Motor Position

The rotation angle of the spacing motor is detected by a position transducer assembly mounted on the spacing motor shaft. The transducer assembly is similar to that mounted on the rotate motor. (see FIGURE 4-19)

PAPER FEED MECHANISM

The paper feed mechanism advances the print paper to the desired line position. The mechanism is driven by the paper feed motor. The motor gear drives the paper feed idler gear which in turn drives the platen gear shown in FIG 4-25. The gear ratio of the paper feed motor gear to the platen is such that an eight pulse drive to the motor causes a paper feed of 1/6 inch at the platen. Therefore, paper feed amounts equal to 1/48 inch multiplied by any integer can be obtained.

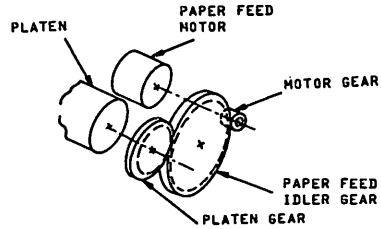


FIGURE 4-25: PAPER FEED MECHANISM

Pressure Roller Assembly

The paper is held against the platen by the pressure roller assembly (FIGURE 4-26). When the paper release lever is pushed backward, the pressure roller assembly is pressed against the platen by spring force. When the platen rotates, the paper is advanced through the pressure rollers and around the platen. The pressure bail holds the paper against the platen just above the printing area as the paper is advanced.

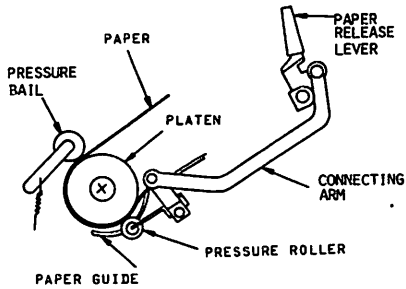


FIGURE 4-26: PRESSURE ROLLER ASSEMBLY

Manual Feed

The platen gear engages the adjustor as shown in FIGURE 4-27. Both the gear and adjuster have fine teeth which mesh and are held together by spring pressure. If the platen knob is depressed in the direction of the arrow in FIGURE 4-26, the teeth on the platen gear and adjuster are disengaged. This allows manual rotation for fine positioning of the platen, regardless of the stepping motor rotational position.

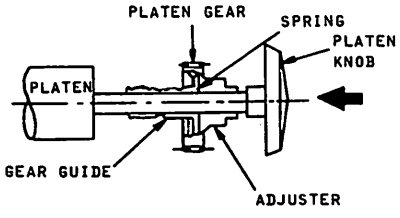


FIGURE 4-27: MANUAL FEED MECHANISM

Tractor Feed

The tractor feed is equipped, with adjustable sprockets drives, to feed paper with sprockets holes at the edge. This assembly allows varibale width, multi-part forms to be advanced precisely, without slippage or misalignment. A gear drive on the left side of the friction platen meshes with an idler gear on the tractor assembly. The drive supplied to the tractor simultaneoulsy causes the tractor to feed as much paper as the platen would feed. The tractor idler gear causes a square shaft to rotate and in turn, rotates the drive pulley on the two tractors. The drive pulley engages a rubber belt (as shown in FIGURE 4-28) which causes the drive pins to rotate the sprocket feed pins.

NOTE

Paper release lever should be pulled forward to disengage pressure rollers when using tractor feed assembly.

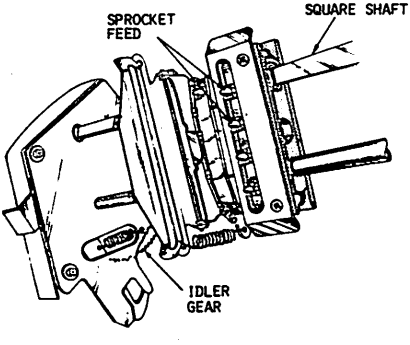


FIGURE 4-28: TRACTOR FEED ASSEMBLY

CUT-SHEET FEEDER

The purpose of the cut-sheet feeder is to move single sheets of paper, from a paper supply, to the Top Of Form postion in the SPINWRITER, and then eject the sheet of paper. The CUT-SHEET FEEDER uses a micro-processor to control its operation. The electrical hand shaking between the SPINWRITER and the CUT-SHEET FEEDER consist only of an ERROR signal from the CUT-SHEET FEEDER, and a RESET signal from the SPINWRITER (Refer to FIGURE 4-29; CUT-SHEET FEEDER BLOCK DIAGRAM).

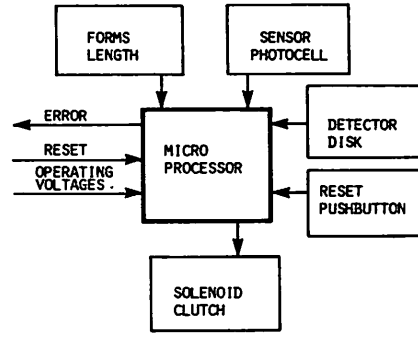


FIGURE 4-29: CUT-SHEET FEEDER BLOCK DIAGRAM

The inputs and outputs of the micro-processor are:

FORMS LENGHT SWITCH - Input - This indicates the length of the paper.

SENSOR PHOTO CELL - Input - Indicates the presence of paper in the feeder. It is used as a paper out indicator.

DETECTOR DISK - Input - Counts the number of lines the paper has advanced.

RESET PUSH BUTTON - Input - Resets the audible and visual error indicators.

SOLENOID CLUTCH - Output - Used to prevent picking of a new sheet of paper.

ERROR - Output - To SPINWRITER, indicates to the SPINWRITER that an error condition exists.

RESET— Input - From SPINWRITER, used to reset CUT SHEET FEEDER micro-processor.

OPERATING VOLTAGES - Input - From SPINWRITER, +17vdc & +5vdc, used to power the CUT-SHEET FEEDER electronics and solenoid.

SETTING TOP OF FORM

Setting Top Of Form requires the operator to manually position the paper to its Top of Form lines up with the top of the print thimble. At this point, press the TOF button. Setting the TOF on the Spinwriter effectively clears the micro-processor in the CUT-SHEET FEEDER, via the

RESET signal. The micro-processor, in the CUT-SHEET FEEDER, then can use the forms length switch and the detector disk to determine where the paper is at any moment.

CUT-SHEET FEEDER OPERATION

All drive power for actually moving the paper is supplied through a gear arrangement (Refer to A, FIGURE 4-31) from the SPINWRITER platen. As the platen in the SPINWRITER turns, this gear arrangement supplies power to the three sets of rollers in the Cut-Sheet Feeder. Paper is fed into the cut-sheet feeder from the paper supply, by Pinch Rollers (FIGURE 4-31). The Pinch Rollers feed the paper to the Main Drive Rollers. The Main Drive Rollers guide and feed the paper past the photo sensor (which detects presence of paper) to the platen in the Spinwriter. The paper then wraps around the platen.

The detector disk (Refer to FIGURE 4-30) is a disk with slots cut in that is attached to the shaft that the Main Driver Rollers are attached to. As the Main Drive Rollers turn the detector disk also turns. Each movement of the detector disk causes a beam of light, to a photo cell, to be broken. The photo cell output is sent to the micro-processor and is used as a count to determine how much paper (in relationship to the forms length) has passed through the Main Rollers.

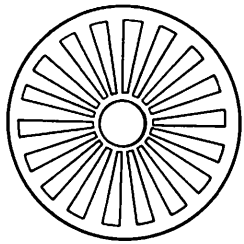


FIGURE 4-30: DETECTOR DISK

When the amount of paper indicated by the forms length switch has been moved through the cut-sheet feeder, the micro-processor engages the solenoid attached to the Pinch Rollers. This removes drive power from the Pinch Rollers and prevents feeding another sheet until the original sheet of paper has been ejected.

When the micro-processor determines that it is time to pick a new sheet of paper, it deenergizes the clutch solenoid. This allows the Pinch Rollers to pick a new sheet of paper.

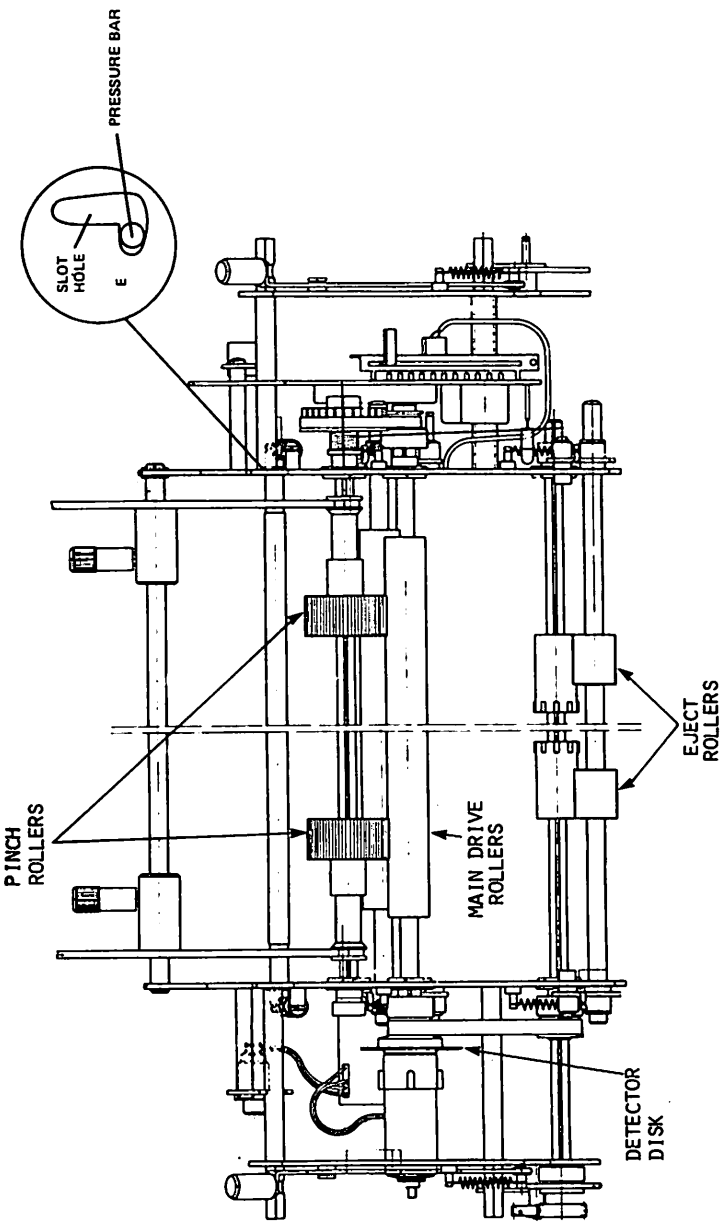


FIGURE 4-31: CUT-SHEET FEEDER ROLLERS POSITION

CHAPTER 5
PREVENTIVE MAINTENANCE

INTRODUCTION

Preventive Maintenance (PM) is performed to clean, check, and lubricate the SPINWRITER. It is recommended that a print sample generated in self-test mode be made prior to the beginning of every PM procedure. Upon completion of the PM procedure another print sample should be made for you and the customer to see the overall improvement in print quality.

PM SCHEDULE

TABLE 5-1 outline the PM schedule to be followed. The schedule is based on the average number of hours per day the printer is used.

TABLE 5-1: PM SCHEDULE

AVERAGE DAILY USAGE	PM SCHEDULE
2 hours or less	ANNUALLY
2-4 hours	SEMI-ANNUALLY
4-6 hours	QUARTERLY
Greater than 6 hours	MONTHLY

CLEANING

Inspect the complete SPINWRITER for any accumulations of foreign material such as bits of paper and clips prior to the specific cleaning procedures below.

1. Using a soft cloth, clean and remove dust from the carriage rails and rollers.
2. Clean the base frame under the carriage.
3. Remove the PCBs and clean the mother board.
4. Use a hand cleaner to remove stains on the cover. Clean the cover with a mild detergent only.
5. Using a soft cloth, clean the platen with a platen cleaning solution.
6. Remove any pieces of paper attached to the tractor assembly and pressure bail.
7. Reassemble printer without cover.

CHECKING

Make a short print sample in self-test to ascertain that the SPINWRITER is functioning properly. Check the following for proper adjustment. Adjustments that can be found in Chapter 6 are in parentheses.

1. Hammer cover assembly firmly fixed in locking lever. (Hammer Assembly)
2. Use hammer jig (911-311552-2) to check hammer position. (Hammer Assembly)
3. Ensure last small figure at print thimble is centered on hammer with power on. (Hammer Assembly)
4. Ensure platen is firmly seated and check clamp lever gap which should be 0.2 to 0.5 mm (0.008 to 0.020 inch). (Platen Clamp Lever)
5. Ensure character density is even from top to botton of character along the print line. (First Position & RT EM Plate)
6. Check line feed gears for smooth motion without any backlash. (Platen Gear)
7. Visually check for any distortion on the platen and print thimble.
8. Check the ribbon change functon. (Ribbon Color Change)
9. Check ribbon feed gear for backlash and free movement. (Ribbon Feed Gear)
10. Check tractors for wear and proper adjustment.
11. Check the paper out and cover open switches.(Cover Open & Paper Out)
12. Ensure wire rope tension is 350 gr (12.35 oz) for a lift or 8 to 10 mm (0.31 to 0.39 inch). Also check wire rope and the associated pulleys for damage or wear. (Wire Rope Tension)
13. With bail rollers at far extremes of ends of platen, insure gap between platen and bail shaft is 1 to 1.5 mm (0.04 to 0.06 inch). (Pressure Bail Roller)
14. Check for loose connectors and terminals.
15. Insure all PCBs are firmly seated.
16. Check pressure roller for proper tension on platen.

LUBRICATION

The general location to be lubricated is shown in Figures 5-1 through 5-4. The detailed or specific locations to be lubricated are found in Figures 5-1A throught 5-4A. Lubrication must be perfomed at least annually, however, caution should be exercised NOT to over lubricate the printer.

Lubricant - Code O
Use a fine watch oil.
Amount - 1 to 2 drops

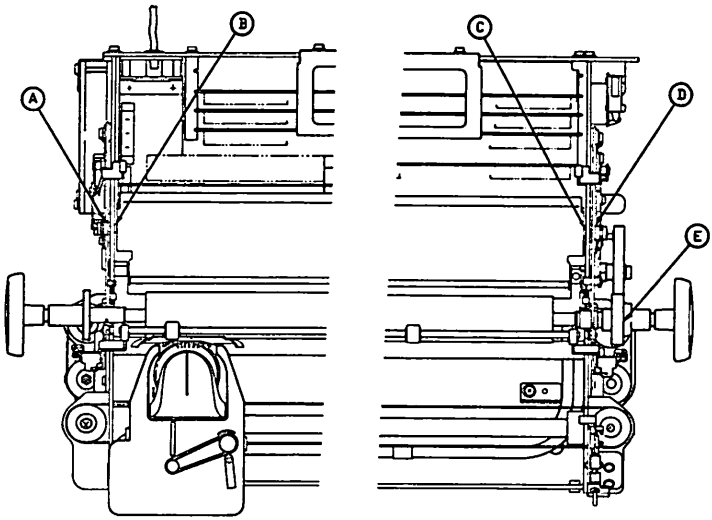
Lubricant - Code G
Use a fine light grease.
Amount - Light Brush Coat

An example of a fine watch oil is Nye's Synthetic Oil #132G. The example of a fine light grease is Nye's Rheolube 368.

LUBRICATING POINTS

Detailed lubricating points are shown in Figures 5-1A through 5-4A. The location to be lubricated is indicated by the letter in the extreme left hand column. The text describes the areas to be lubricated. The letter in parentheses indicates the lubrication code. The code is:

(O) - 1 to 2 drops of oil
(G) - Light brush coat



LOCATION DESCRIPTION

A. Outside of the fitting between the control shaft and line feed frame assembly. (G)

B. Inside of the fitting between the control shaft and line feed frame assembly. (G)

C. Inside of the fitting between the control shaft and line feed frame assembly. (G)

D. Outside of the fitting between the control shaft and line feed frame assembly. (G)

E. Platen adjuster. (O)

FIGURE 5-1: LUBRICATING POINTS (TOP VIEW)

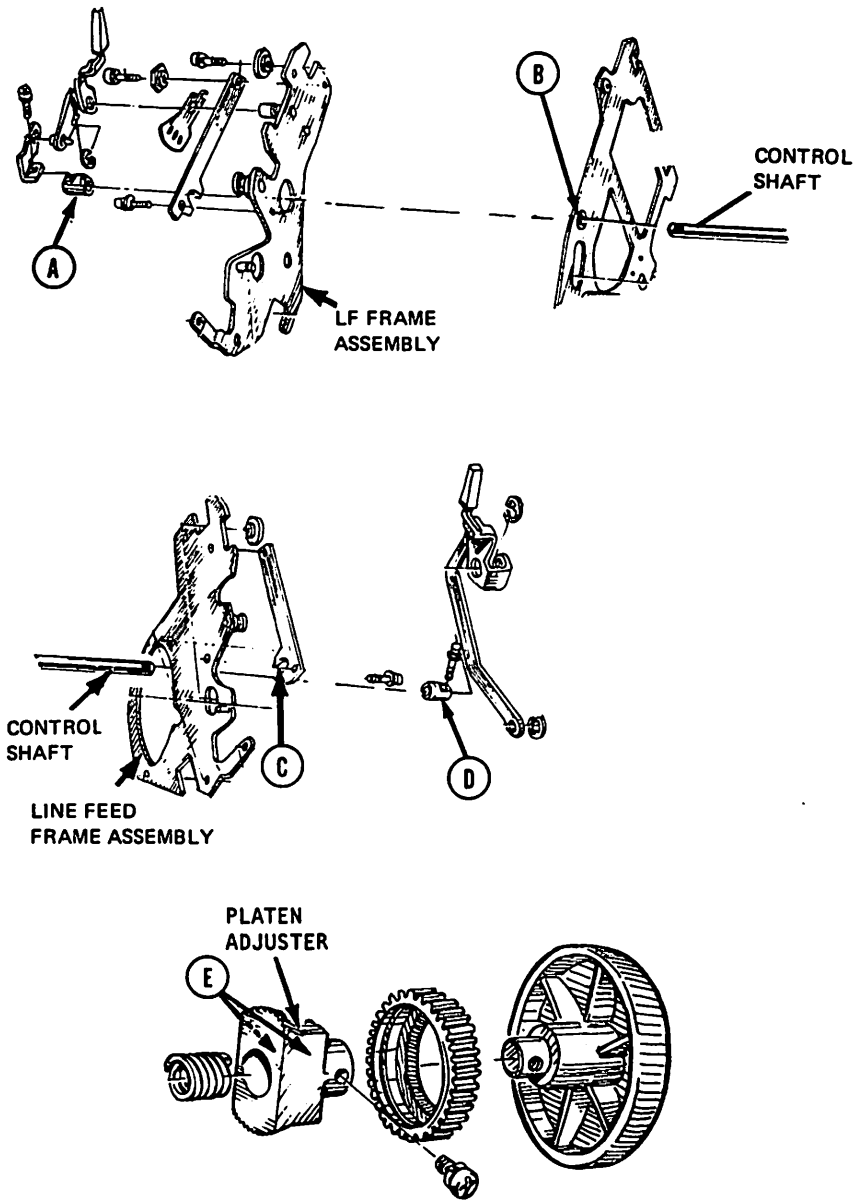


FIGURE 5-1A: DETAILED LUBRICATING POINTS OF FIGURE 5-1

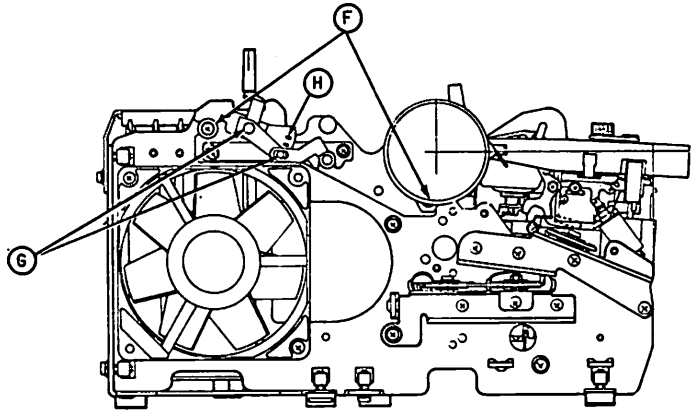


FIGURE 5-2: LUBRICATING POINTS (LEFT SIDE VIEW)

LOCATION	DESCRIPTION
F.	Line feed frame slide bushing. (G)
G.	Control lever assembly fitting. (G)
H.	Detent spring. (G)

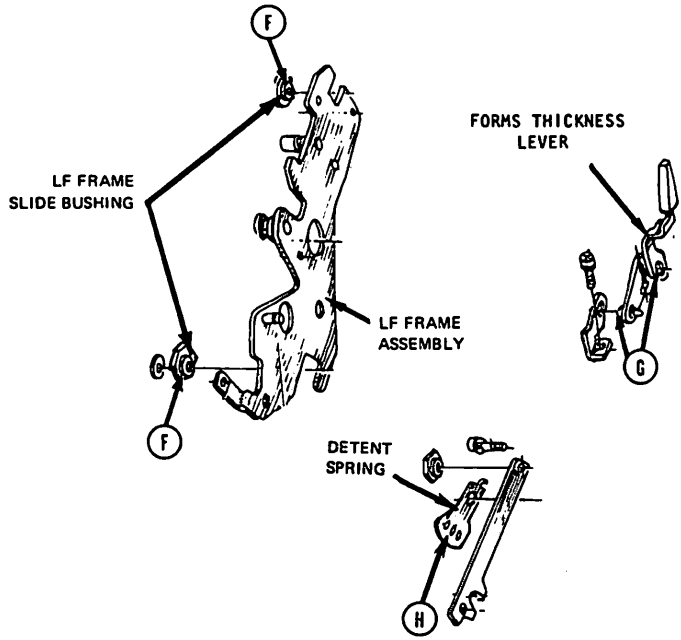


FIGURE 5-2A: DETAILED LUBRICATING POINTS OF FIGURE 5-2

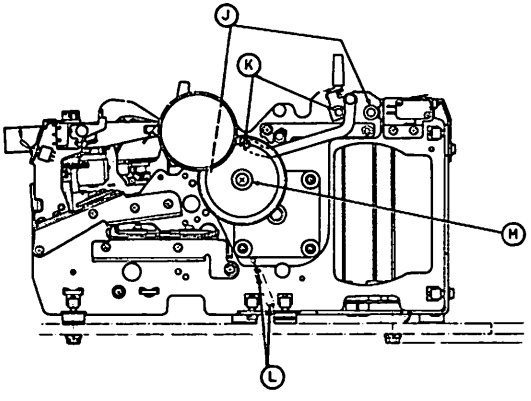


FIGURE 5-3: LUBRICATING POINTS (RIGHT SIDE VIEW)

LOCATION	DESCRIPTION
J.	LF frame slide bushing. (G)
K.	Pressure lever fitting. (G)
L.	Line feed frame spring. (G)
M.	Line feed idle gear bushing. (G)

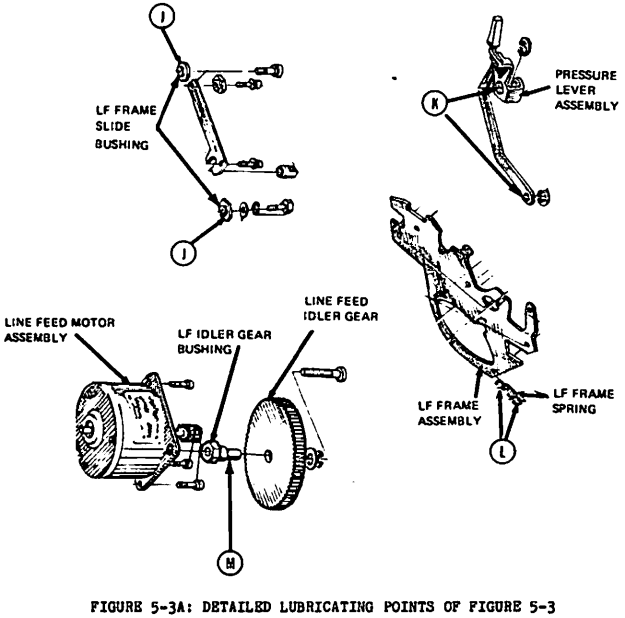


FIGURE 5-3A: DETAILED LUBRICATING POINTS OF FIGURE 5-3

(2) CARRIAGE

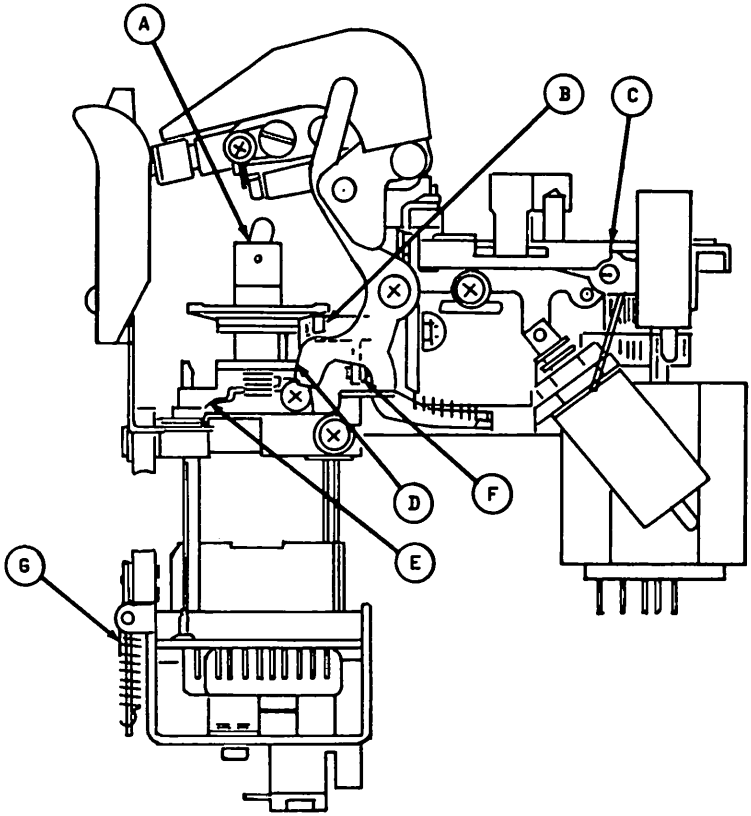


FIGURE 5-4: CARRIAGE ASSEMBLY LUBRICATION POINTS (SIDE VIEW)

LOCATION	DESCRIPTION
A.	Rotate motor oil felt. (O)
B.	Vertical motor cam follower rotating pivot. (O)
C.	Ribbon base and ribbon change arm rotating pivot. (O)
D.	Vertical motor cam follower bearing. (O)
E.	Slide sleeve and torque piece sliders. (O)
F.	Drive cam follower bearing. (O)
G.	Bearing holder rotating pivot. (O)

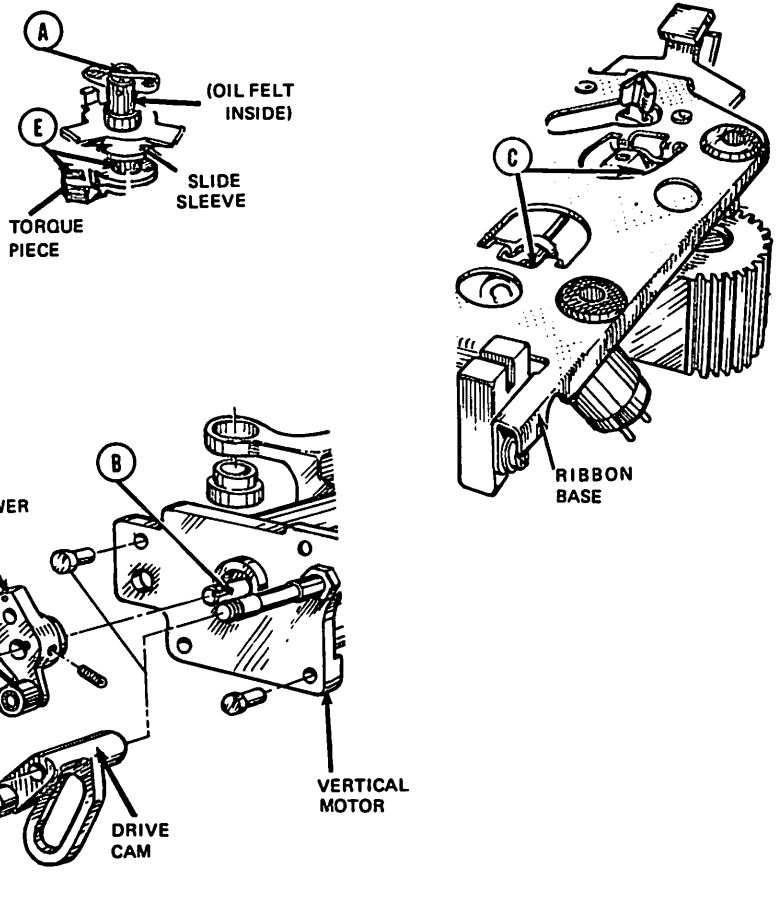


FIGURE 5-4A: DETAILED LUBRICATING POINTS OF FIGURE 5-4

CUT-SHEET FEEDER PREVENTIVE MAINTENANCE

Preventive maintenance (PM) consists of cleaning and lubricating, and should be preformed during the PM of the SPINWRITER. This will ensure that the cut-sheet feeder operates correctly.

CLEANING

Inspect the entrire cut-sheet feeder for any accumulations of foreign material (such as bits of paper and paper clips). Clean and remove dust from all surfaces. Be sure to clean the slide bushings at location D.

LUBRICATION

Lightly grease the cut-sheet feeder points shown in Figure 5-5.

LOCATION	DESCRIPTION
A.	Ball Bearings (G)
B.	Belt pulley axle (G)
C.	Torsional spring (G)
D.	Slide bushing groove (for left and right paper guides) (G)
E.	Pressure shaft slot holes where the pressure shaft creates friction when the unit is loaded (in left and right main plates) (G)
F.	Gear wheel teeth (G)

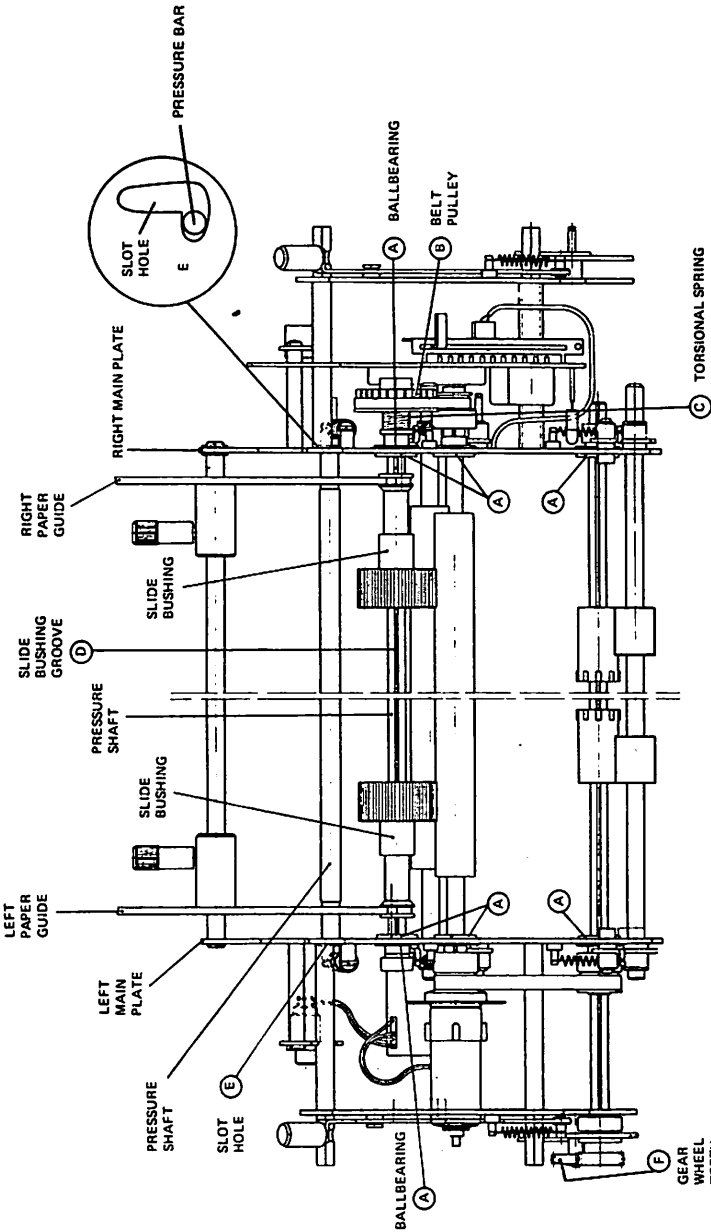


FIGURE 5-5: CUT-SHEET FEEDER LUBRICATION POINTS

CHAPTER 6
CORRECTIVE MAINTENANCE
SECTION 1 - TROUBLESHOOTING

INTRODUCTION

The SPINWRITER is designed for long life and trouble-free operation. The troubleshooting procedures described in this section assist in fast isolation of faults to a particular unit or assembly. Field repair is best achieved at the ORU (Optimum Replaceable Unit) level. For this reason, only assemblies and easily replaceable parts are listed as field maintenance items.

GENERAL RULES

The following general rules must always be adhered to when performing replacement, removal, and adjustments:

1. Never remove or install any circuit board or disconnect any plug while power is on.
2. Disconnect the power cord prior to part replacement.
3. When removing or replacing units, use great care to avoid dropping any parts or hardware inside the housing. If this occurs, immediate removal is imperative; otherwise unnecessary malfunctions may occur.
4. When removing connectors, do not grasp the wire bundle to exert pressure. Hold the connector firmly by its sides to pull it out.
5. Because wire ropes are easily damaged, use caution when handling them. Particular care must be taken whenever removing or replacing the carriage assembly.
6. Do not remove any parts which are not specified in the replacement procedures.
7. After completion of replacement, lubricate the specified items following the proper procedures.
8. Printed circuit boards marked MOSC USE or MOSIC must be packaged in a special electrostatic-free envelope whenever they are transported.

REQUIRED MAINTENANCE TOOLS

The tools required for conducting the maintenance procedures of this manual are listed Table 1-1. Tools listed in the metric section are used mainly to repair the Carriage Assembly.

TABLE 6-1: MAINTENANCE TOOLS

COMMON TOOLS

- Screw Driver 5/32 Tip
- Phillips No. 1
- Phillips No. 2
- Phillips Long Shaft
- Spring Hook
- Tension Gauge (680g/2 lb)
- 12" Ruler
- Dual Trace Oscilloscope
- Voltmeter

METRIC TOOLS

- Box Driver 5.5 mm
- Wrench 5.5. mm
- Wrench 7 mm
- Wrench 8 mm
- Wrench 10 mm
- Wrench 12 mm
- Wrench 14 mm
- Hex Key 1.5 mm
- Feeler Guages

SPECIAL TOOLS

The SPINWRITER part numbers are in parenthesis.

- Hammer Position Jig (911-311552-2)
- Wire Rope Winding Jig (911-311551)
- Left Margin Position Jig (911-317608)
- PCB Puller (19-22833)
- Narrow Extender Board (DU-7466)
- Wide Extender Board (DU-7467)
- Lubrication Kit (999-000001)

This section describes the suggested approach for troubleshooting the SPINWRITER. Most malfunctions can be identifed by using the Self-Test feature (refer to Chapter 3 on operating instructions). To minimize machine down time at the customer site, troubleshooting is limited to replacement of ORU's (subassemblies). The suspected defective subassembly should be repaired at the District Repair Center. If the subassembly can not be repaired at the District level it should be returned to Field Parts Support. Flow charts have been created as a logical approach for localizing malfunctions to the suspected faulty subassembly.

Using TABLE 6-2 determine which FAILURE CONDITION most closely resembles the SPINWRITER malfunction.

TABLE 6-2: FAILURE CONDITIONS

CATASTROPHIC FAILURE	
ONLY FAN OPERATES	FIGURE 6-1
NO RETURN TO FIRST PRINT POSITION	FIGURE 6-2
ENTIRE FAILURE OF OPERATION	FIGURE 6-3
PRINT THIMBLE DOES NOT STOP ROTATION	FIGURE 6-4
IMPOSSIBLE TO START PRINT OPERATION	FIGURE 6-5
PRINTING MALFUNCTIONS	
MISPRINTING	FIGURE 6-6
UNEVEN PRINT DENSITY ON CHARACTER	FIGURE 6-7
CHARACTER MISSING	FIGURE 6-8
IMPROPER HORIZIONTAL ARRAY	FIGURE 6-10
IMPROPER PRINTING OF CHARACTER ARRAY	FIGURE 6-11
PAPER MALFUNCTIONS	
PAPER SKEWING	FIGURE 6-9
IMPROPER PAPER FEED	FIGURE 6-12
NO PAPER FEED	FIGURE 6-13
RIBBON MALFUNCTIONS	
TRUNCATION OF PRINTED CHARACTERS	FIGURE 6-14
MINGLED COLORS	FIGURE 6-15
IMPROPER VISIBILTY	FIGURE 6-16
RIBBON END NOT DETECTED	FIGURE 6-17
COLOR TURNING	FIGURE 6-18
MISCELLANEOUS MALFUNCTIONS	
COVER OPEN NOT DETECTED	FIGURE 6-19
HAMMER IMPRESSION CONTROL NOT FUNCTIONING	FIGURE 6-20
MISCELLANEOUS UNACCEPTABLE PRINT QUALITY	FIGURE 6-21

VOLTAGES

Power supply voltages can be checked on the G9GBP or G9EMT regulator card. The G9GBP is the heavy duty version of the G9EMT and is used when the Cut-Sheet Feeder option is installed. The output voltages of the regulator card and there respective grounds are available at test pins located near the top edge of the regulator card. These voltages are ±17vdc and DG (ground) and +5, ±12vdc and SG (ground). The test pins are labeled to avoid confusion. Connector CN11 supplies the regulator card with its input voltages. Connector CN12 is the output of the regulator.

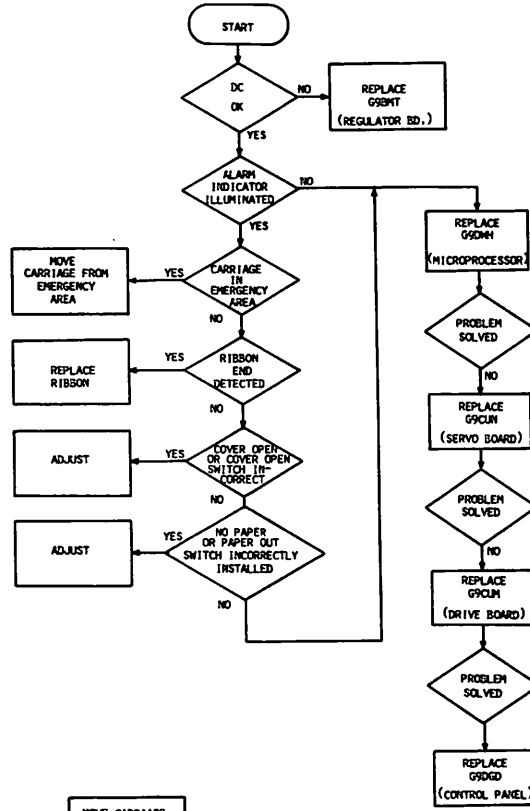


FIGURE 6-1: ONLY FAN OPERATES

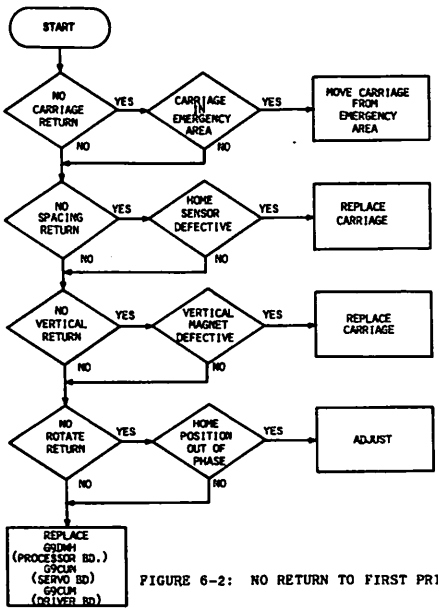


FIGURE 6-2: NO RETURN TO FIRST PRINT POSITION

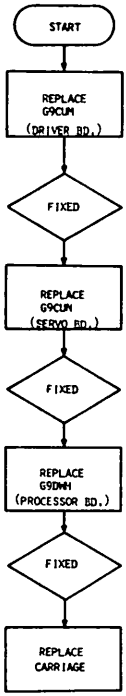


FIGURE 6-4: PRINT THIMBLE DOES NOT STOP ROTATION

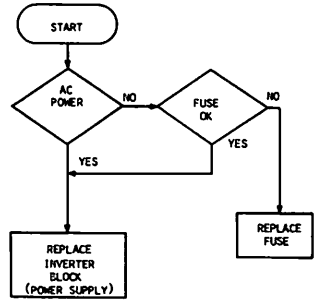


FIGURE 6-3: ENTIRE FAILURE OF OPERATION

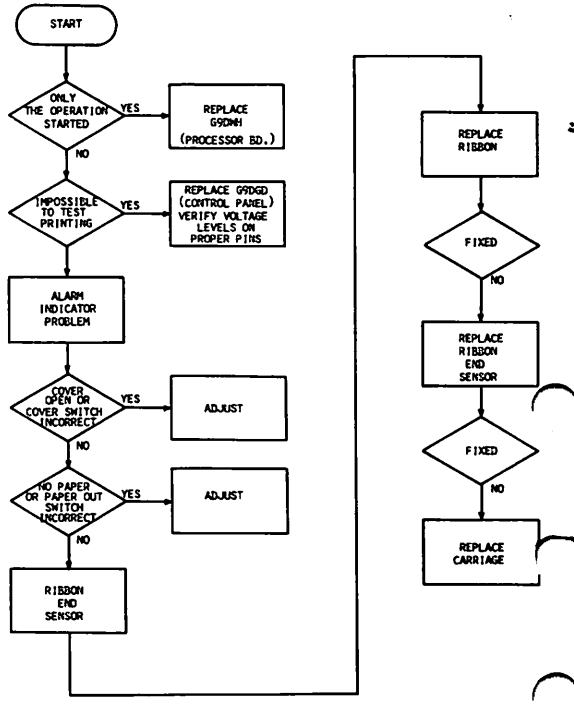


FIGURE 6-5:: IMPOSSIBLE TO START PRINT OPERATION

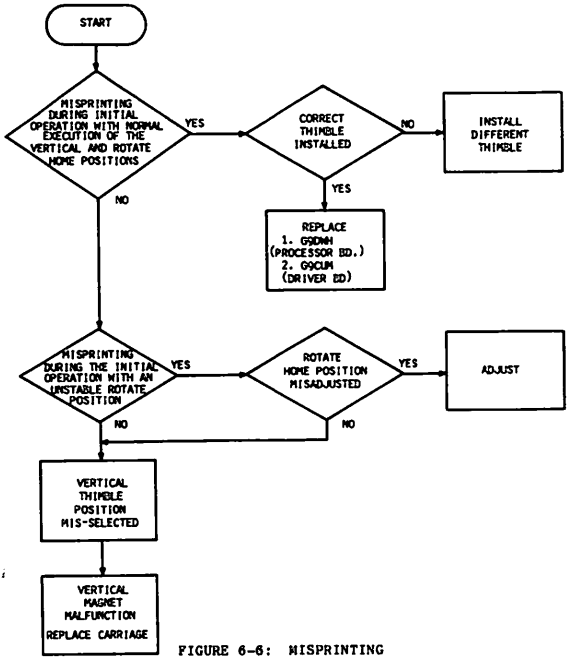


FIGURE 6-6: MISPRINTING

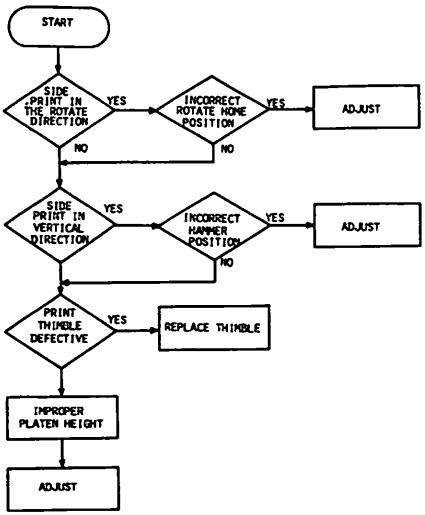


FIGURE 6-7: UNEVEN PRINT DENSITY ON CHARACTER

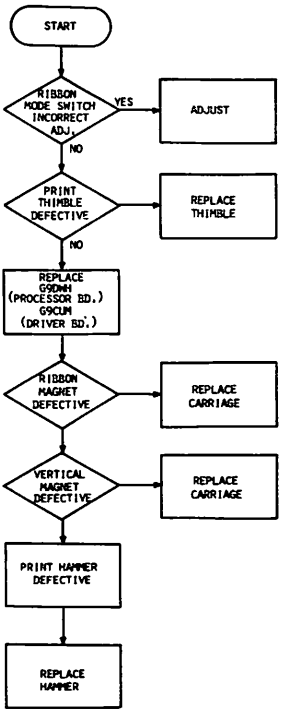


FIGURE 6-8: CHARACTER MISSING

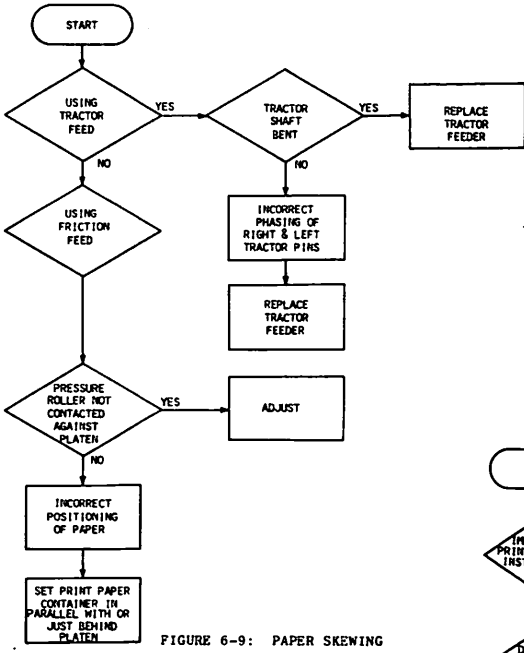


FIGURE 6-9: PAPER SKEWING

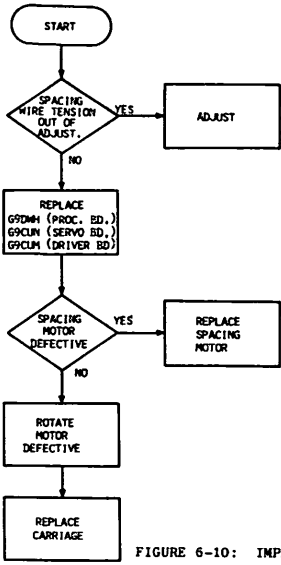


FIGURE 6-10: IMPROPER HORIZONTAL ARRAY

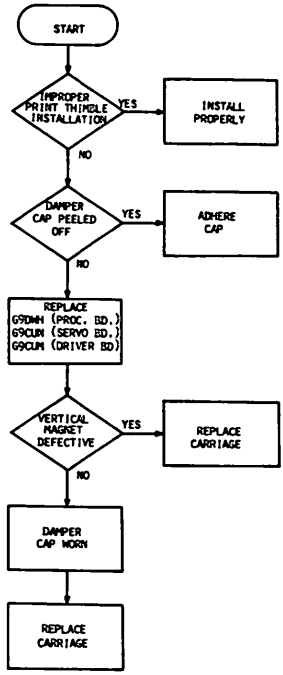


FIGURE 6-11: IMPROPER PRINTING OF CHARACTER ARRAY

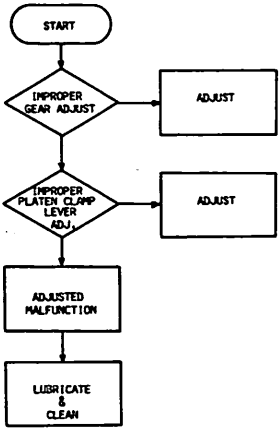


FIGURE 6-12: IMPROPER PAPER FEED

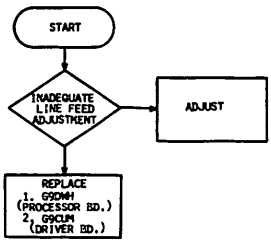


FIGURE 6-13: NO PAPER FEED

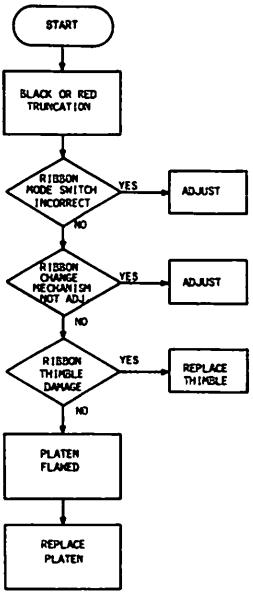


FIGURE 6-14: TRUNCATION OF PRINTED CHARACTERS

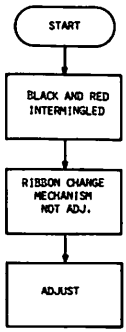


FIGURE 6-15: MINGLED COLORS

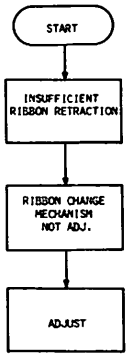


FIGURE 6-16: IMPROPER VISIBILITY

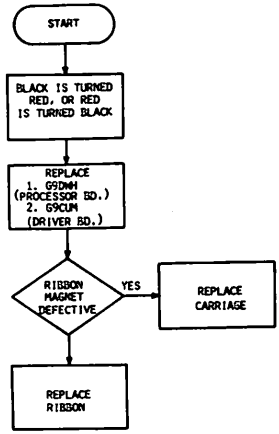


FIGURE 6-18: COLOR TUNING

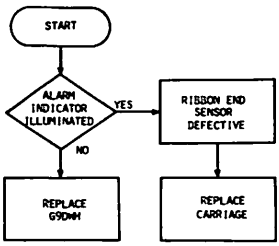


FIGURE 6-17: RIBBON END NOT DETECTED

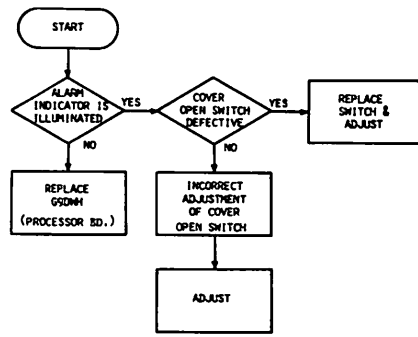


FIGURE 6-19: COVER OPEN NOT DETECTED

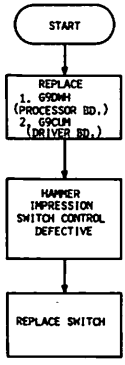


FIGURE 6-20: HAMMER IMPRESSION CONTROL NOT FUNCTIONING

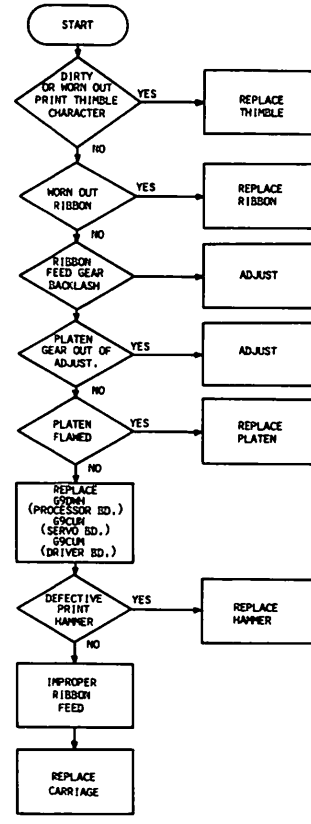


FIGURE 6-21: MISCELLANEOUS UNACCEPTABLE PRINT QUALITY

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CHAPTER 6
CORRECTIVE MAINTENANCE
SECTION 2 - PARTS REPLACEMENTS & ADJUSTMENTS

INTRODUCTION

The adjustment procedures described in this section are all essential for field maintenance of the SPINWRITER. The adjustment standards must be adhered to at all times.

HAMMER ASSEMBLY

Improper position of the hammer assembly will result in uneven print density top to bottom of the character. Rotate Home position problems will appear as uneven print density on the sides of the characters.

LOCK LEVER ADJUSTMENT

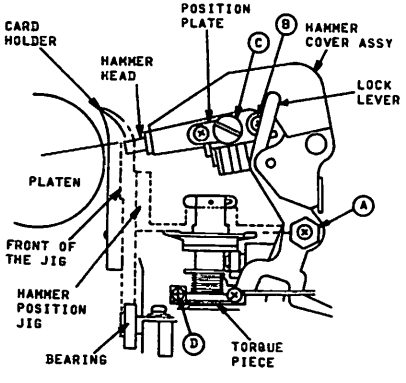


FIGURE 6-22: PRINT HAMMER ADJUSTMENT

1. Refer to Figure 6-22. Loosen the screw securing eccentric stud A.
2. Turn eccentric stud A until the lock lever secures the hammer cover assembly firmly in place.

HAMMER POSITION ADJUSTMENT

1. Remove the print thimble and set the hammer position jig (part number 911-311552-2) in its place.
2. Loosen the holding screws B and C on both sides of hammer (Figure 6-22).
3. Align top and end of the hammer in the jig as illustrated in Figure 6-23, and then tighten screw C (both sides).
4. Verify that the alignment performed in step #3 is still correct before tightening screw B (both sides).

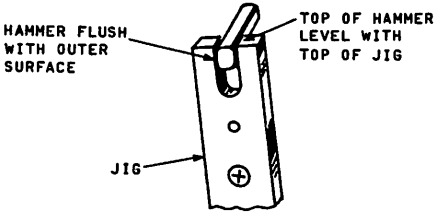


FIGURE 6-23: HAMMER HEAD TO JIG SLOT ALIGNMENT

ROTATE HOME POSITION ADJUSTMENT

1. With print thimble in printer, turn power on.
2. Check to see if hammer is centered on last short finger of the print thimble.
3. To adjust, loosen screw D (Figure 6-22) of the torque piece and rotate the torque piece for proper alignment.
4. Power unit off and on to verify alignment.

NOTE

An added check can be made by replacing the print thimble with the hammer position jig while power is on. Hammer should align in jig slot. Remove jig before powering off (see Figure 6-23).

RIBBON COLOR CHANGE ADJUSTMENT

If there is incomplete printing of characters, or if using a multi-color ribbon there is a intermingleing of red and black colors, these adjustments should be checked. Use a red/black ink ribbon to perform the following adjustments.

RIBBON COLOR (Black)

1. Refer to Figure 6-24. Slide the ribbon mode switch to the red/black position.
2. Adjust the ribbon base stopper using screw A (Figure 6-24) so that the gap between the ribbon top edge and the top projection of the card holder bracket (Figure 6-25) is within the range of 0 mm ± 0.1 mm (0-inch ± 0.004-inch).

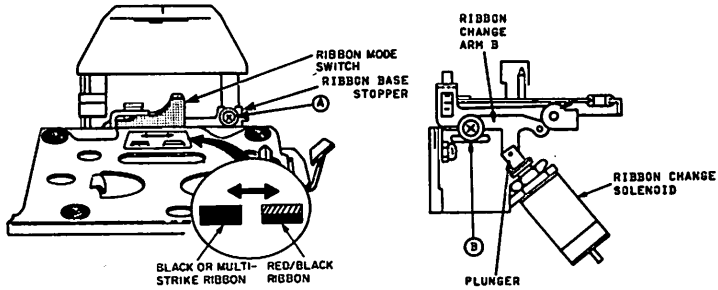


FIGURE 6-24: RIBBON COLOR CHANGE ADJUSTMENT LOCATION

RIBBON COLOR (Red)

1. Slide the ribbon mode switch to the red/black position.
2. Loosen adjusting screw B shown in Figure 6-24.
3. Depress the plunger on the ribbon change solenoid so that the ribbon platform is down.
4. Move ribbon change arm B up or down so that the gap between the ribbon top edge and the print thimble long finger top edge 1.0 ± 0.2 mm (0.04 ± 0.008- inch) as shown in Figure 6-26.
5. Tighten adjusting screw B.

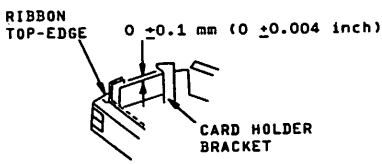


FIGURE 6-25: RIBBON COLOR BLACK ADJUSTMENT

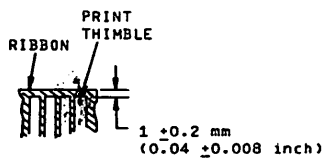


FIGURE 6-26: RIBBON COLOR RED ADJUSTMENT

VISIBLE POSITION

1. Slide the ribbon mode switch to the red/black position.
2. Take up ribbon slack.
3. Rotate the thimble so that the short fingers are in front of the hammer assembly.
4. Depress the plunger on the ribbon change solenoid so that the ribbon platform is down.
5. Refer to Figure 6-27. Verify that the gap between the ribbon top edge and the print thimble top edge is 0 mm ± 1.0 mm (0-inch ± 0.04-inch). This check may be done visually.

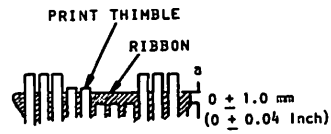


FIGURE 6-27: VISABLE POSITION ADJUSTMENT

RIBBON FEED GEAR ADJUSTMENT

If the ribbon fails to feed, or has intermittent feeding problems, this adjustment should be checked.

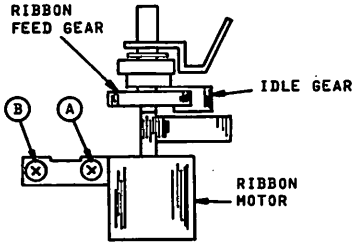


FIGURE 6-28: RIBBON FEED GEAR ADJUSTMENT

1. Refer to Figure 6-28. Check backlash between idle gear and ribbon feed gear for tolerance of 0.05 mm to 0.2 mm (0.002 inch to 0.008 inch).
2. Adjust backlash by turning screws A and B (Figure 6-28).
3. Rotate idle gear manually following adjustment to ensure that gear rotates freely.

CARD HOLDER ADJUSTMENT

If the paper is jammed against the platen or the carriage is dragging against the paper, this adjustment should be checked.

1. Push forms thickness lever toward arrow direction B (Figure 6-29).
2. Loosen screw A in Figure 6-29.
3. Adjust the card holder position for a clearance of 0.6 - 0.8 mm (0.024 - 0.032 inch) between the card holder and the platen.
4. Tighten screw A.

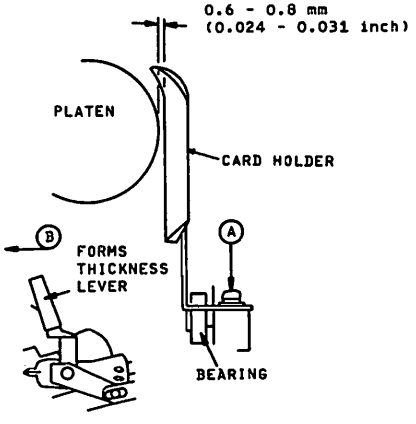


FIGURE 6-29: CARD HOLDER ADJUSTMENT

PLATEN CLAMP LEVER ADJUSTMENT

If there is play, or movement in the platen, or the platen is not locked into place, check this adjustment.

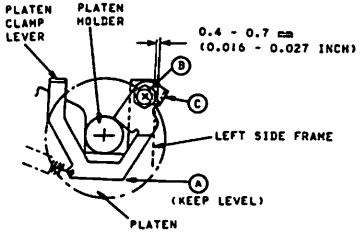


FIGURE 6-30: PLATEN CLAMP LEVER ADJUSTMENT

1. With the platen mounted in place, bring the bottom A (Figure 6-30) of the platen clamp lever position by turning the eccentric bushing B.
2. After this adjustment, maintain a clearance of 0.4 mm (0.016 inch) to 0.7 mm (0.027 inch) between the stop lever C and the left side frame.
3. Confirm that there is no play of the platen.

PLATEN GEAR ADJUSTMENT

If the paper slips, the platen fails to move, or slips this adjustement should be checked.

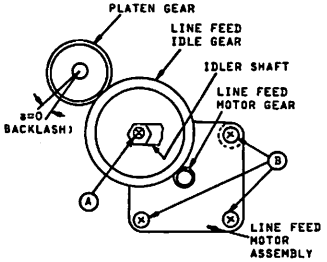


FIGURE 6-31: PLATEN GEAR ADJUSTMENT

1. Refer to Figure 6-31. Remove the platen assembly.
2. Loosen three screws B on the line feed motor.
3. Loosen screw A and adjust the eccentric idler shaft for zero backlash between the line feed idle gear and motor gear.
4. Retighten screw A and check for smooth rotation, feeling only the inherent friction of the motor.
5. Attach the platen assembly.
6. Position the line feed motor for zero backlash between the line feed idle gear and the platen gear. Retighten three screws B.
7. Check for smooth rotation of the gears in both clockwise and counter clockwise directions, feeling only the inherent friction of the line feed motor.

PLATEN HEIGHT

If there is uneven print density from top to bottom of the character, it is an indication of the possiblity that the platen height is out of adjustment. Prior to performing this adjustment all hammer ajustments should be checked.

CAUTION

THIS ADJUSTMENT IS MADE IN THE FACTORY WITH SPECIAL JIGS. DO NOT ATTEMPT ADJUSTMENT IN THE FIELD UNLESS COPY QUALITY IS ILLEGIBLE.

NOTE

Reverse platen assembly to ensure that the problem is not caused by a worn platen. Replace the platen in its correct position when completed. Also check for a worn ribbon or print thimble.

1. Refer to Figure 6-32. ~~If print density varies from top to bottom of the character, platen height can be adjuted by screw B. There is one on either side.~~
2. If print density varies from left to right of the print line, install a worn ribbon and set the forms thickness lever for the lightest print possible on the acceptable side. (With a worn ribbon, it is easier to adjust the print line for equal print density throughout without overshooting the correct position of the platen.)
3. Loosen screw B on the unacceptable end of the print line and adjust screw C until print density is uniform.

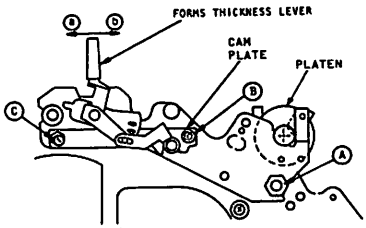


FIGURE 6-32: PLATEN HEIGHT ADJUSTMENT

FIRST PRINT POSITION AND RIGHT EMERGENCY (EM) PLATE ADJUSTMENT

These adjustments prevent the carriage from traveling too far to the right, or left, and hitting the frame. The First Print Position should also be checked if, when running the self test, the First Print Position is not in the correct position.

FIRST PRINT POSITION

1. The first print position (the extreme left position) should be 58 mm, ±0.3 mm (2.28 inch, ±0.012) from the left side frame. To adjust to this position, slide the left side EM plate on the base frame in the required direction (along the arrows).
2. Confirm that the EM plate does not interface with the sensor on the bottom of the carriage.
3. Confirm that the setting is correct by powering up the printer and measuring with the carriage position jig (part number 911-317608) or suitable measuring device.

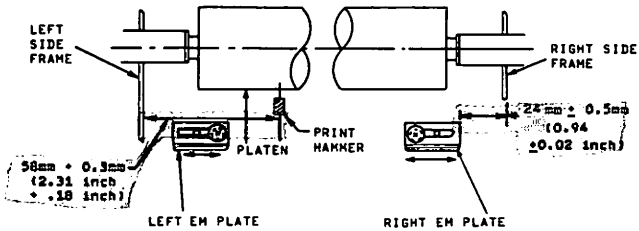


FIGURE 6-33: 1st PRINT POSITION & RIGHT EM PLATE ADJUSTMENT

POSITION OF RIGHT EM PLATE

1. Position the right side EM platen 24 mm ±0.5 mm (0.94 ± 0.02 inch) from the outside of the right side frame as shown in Figure 6-33.
2. Confirm that there is no interference between the EM plate and the sensor on the bottom of the carriage.

PRESSURE ROLLER ADJUSTMENT

If the paper slips or fails to move when the paper bail is in position, these adjustments should be checked.

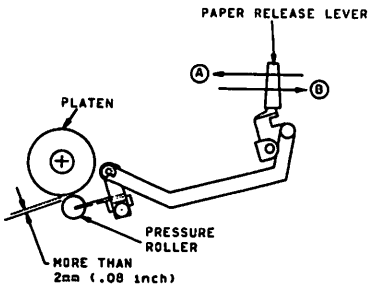


FIGURE 6-34: PRESSURE ROLLER ADJUSTMENT

1. With the platen installed, pull the paper release lever toward arrow direction A (Figure 6-34) to release the pressure rollers from the platen.
2. Confirm visually that the clearance between the platen and the pressure roller is more than 2 mm (0.08 in).
3. Push the paper release lever toward arrow direction B.
4. Confirm that all rollers apply pressure against the surface of the platen.

PRESSURE BAIL ROLLER ADJUSTMENT

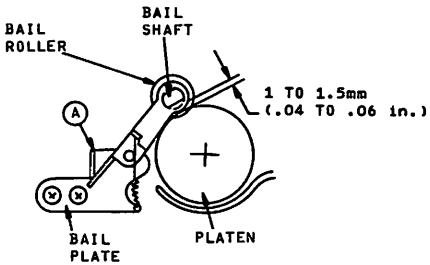


FIGURE 6-35: PRESSURE BAIL ROLLER ADJUSTMENT

1. Slide the bail rollers (Figure 6-35) until they are outside the rubber part of the platen.
2. Confirm that the gap between the bail shaft and the platen is within a range of 1 to 1.5 mm (0.04 to 0.06 inch).
3. Reform the stopper A of the bail plate as required.

WIRE ROPE TENSION ADJUSTMENT

The wire rope moves the carriage to its correct print position. If there is a character spacing problem, this adjustment should be checked.

1. Loosen nut B (Figure 6-36) on the left side guide pulley.
2. Position the carriage at the far right margin.
3. Pull up on the wire rope at a point (C) 185 mm (7.28 in) from the left side frame with a spring force of 350 grams (12 1/4 oz.).
4. Adjust screw A to meet a wire rope distortion of 8 to 10 mm (0.32 - 0.4 in). (Use a spring tension guage with maximum range of 700 grams.)

5. Move the carriage unit to right and left about ten times and then place it at the right end.

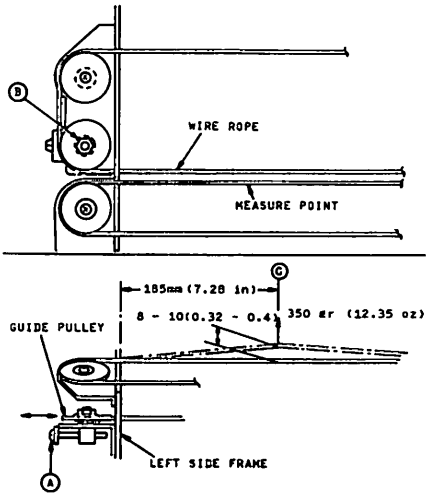


FIGURE 6-36: WIRE ROPE ADJUSTMENT

6. Re-confirm step 4. If the wire rope distortion is out of range, repeat steps 3 through 5.

7. Pull up on the wire rope at a point (d) 185 mm (7.28 inch) from the right side frame with the spring force of 350 grams (12 1/4 oz).

8. Confirm a wire distortion of 6 to 10 mm. If the wire rope distortion is within range, tighten nut B. If the wire rope distortion is out of range, repeat steps b through h. That is, if a wire distortion is 8 to 10 mm, another distortion is allowed from 6 to 10 mm. Table 6-3 indicates the various acceptable wire distortion combinations.

TABLE 6-3: WIRE ROPE ADJUSTMENT SPECS

DISTORTION (mm) LEFT SIDE	RIGHT SIDE	ACCEPTABLE
8-10	8-10	YES
6-8	8-10	YES
8-10	6-8	YES
6-8	6-8	NO

PAPER-OUT SWITCH

Should the printer fail to detect paper-out, or continuously indicate paper-out even when there is paper in the machine, this adjustment should be checked.

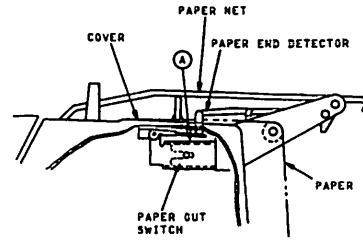


FIGURE 6-37: PAPER-OUT SWITCH ADJUSTMENT

1. With the paper properly set, the paper-end detector must not contact actuator A in Figure 6-37 of the paper-out switch.

2. When the paper is out, the paper-out switch is activated by the paper-end detector dropping to the paper-out switch.

3. If steps 1 and 2 are not satisfied, reform the paper-end detector so that it will operate the switch properly.

COVER-OPEN SWITCH

Opening and closing the cover should result in stopping and starting the printer operation and illuminating the ALARM light. If this is does not occur, the cover-open switch adjustment should be checked.

1. Raise the top cover.

2. Adjust the cover-open switch assembly so that the high point of the switch feeler engages the switch actuator with the cover closed.

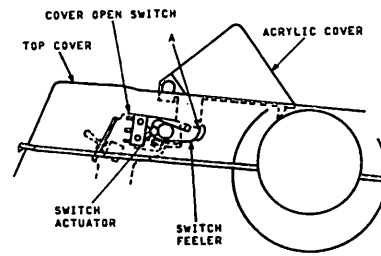


FIGURE 6-38: COVER-OPEN SWITCH ADJUSTMENT

CUT-SHEET FEEDER ADJUSTMENTS

The adjustment procedures described are all essential for field maintenance of the cut-sheet feeder. They should be performed only after replacing a part. There are no adjustments that should be checked or performed during PM. The adjustment standards must be adhered to at all times.

The following items have had there names changed from the vendor's designation, to a name that identifies its purpose.

Vendor Name	Manual Name
RUBBER DRIVE SHAFT	MAIN DRIVE SHAFT
PROFILE RUBBER SHAFT	EJECT ROLLER SHAFT
RUBBER SHAFT	PINCH ROLLER SHAFT
PROFILE RUBBER SHAFT	IDLER ROLLER SHAFT

When making the adjustments that require tightening the lock collar setscrews, ensure that the setscrews are between the slits of the gear wheels or slotbushings and between the nuts of the shafts (Figure 6-62).

MAIN DRIVE SHAFT ADJUSTMENT

This adjustment will allow the paper to guide correctly through the Cut-Sheet Feeder. If the paper is damaged (i.e. crinkled, or bent) before it leaves the feeder, this adjustment and the correct loading of the paper supply should be checked.

1. Remove the right and left covers.
2. Remove the solenoid.
3. Remove the slot socket and detector disk.

NOTE

The connector PCB may have to be slid out slightly.

4. Measure the distance between the end of the main roller drive shaft and the edge of the left main plate (Figure 6-40). It should be 0.6 inch (15 mm).
5. If adjustment is needed, loosen the lock collar setscrew on the right side and slide the shaft to attain the dimension.
6. Tighten the setscrew.

NOTE

Ensure that the two ball bearings are into position in the left and right main plates.

DETECTOR DISK ADJUSTMENT

This adjustment will prevent binding of the detector disk against the photo cell. It also adjusts the dector disk position against the solenoid.

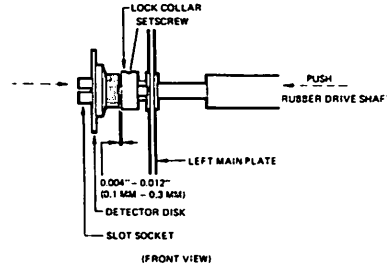


FIGURE 6-39: DETECTOR DISK ADJUSTMENT

1. Ensure that the SPINWRITER power is off.
2. Remove the left and right covers.
3. Loosen the lock collar setscrew (Figure 6-39).
4. On the right side of the rubber drive shaft, push left using a screwdriver.

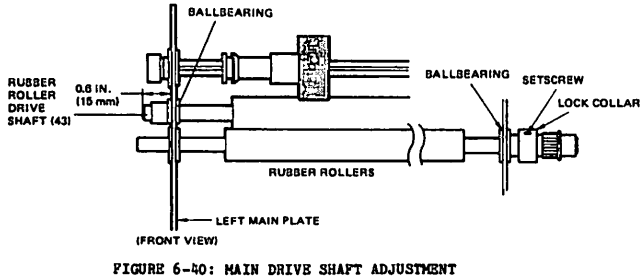


FIGURE 6-40: MAIN DRIVE SHAFT ADJUSTMENT

5. Slide the detector disk maximum left.

6. Slide lock collar to get dimension 0.004 to 0.012 inch (0.1 to 0.3 mm) between the detector disk and lock collar and tighten setscrew.

7. Make sure the solenoid engages.

ONE-WAY CLUTCH BELT PULLEY ADJUSTMENT

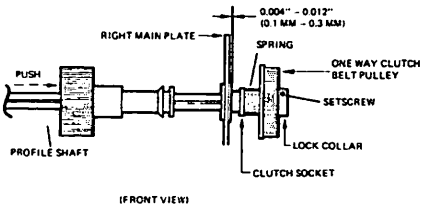


FIGURE 6-41: ONE-WAY CLUTCH BELT PULLEY ADJUST.

1. Remove the left and right covers.

2. Turn platen knobs in reverse direction (counterclockwise) to relieve the spring tension.

3. Push pressure bar down.

4. Loosen the lock collar setscrew (Figure 6-41).

5. Press in on the profile (cover) shaft from the left.

6. Obtain 0.004 to 0.012 inch (0.1 to 0.3 mm) between the right main plate and clutch socket.

7. Tighten the lock collar setscrew.

EJECT ROLLER SHAFT ADJUSTMENT

The rollers on the eject roller shaft and idler shaft should line up (Figure 6-42). This can be checked by removing the front profile (cover). The adjustment is performed as follows:

1. Remove the left and right covers.

2. Loosen the three lock collar setscrews on the eject roller shaft (Figure 5-4).

3. Slide the eject roller shaft until the rollers line up with the idler rollers.

4. Ensure that the right lock collar is against the right main plate and tighten the setscrew.

5. Turn the shaft to let the belt pulley and associated lock collar seek the correct operational position.

6. Tighten the setscrew.

7. Position the left lock collar in the center of the left supporting plate and tighten the setscrew.

CAUTION

Ensure that the two ball bearings are into position in the left and right main plates.

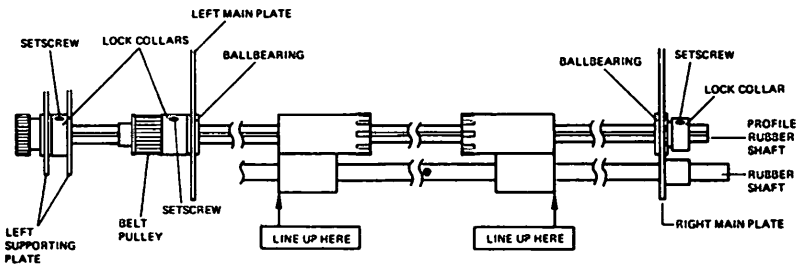


FIGURE 6-42: EJECT ROLLER SHAFT ADJUSTMENT

LIGHT BARRIER ADJUSTMENT

Always make the light barrier adjustment after changing logic PCB photocells P1 and P2. This measurement requires a dual trace oscilloscope.

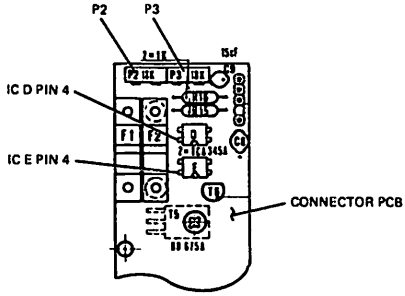


FIGURE 6-43: LIGHT BARRIER PROBE ADJUSTMENT

1. Make sure the cut-sheet feeder is mounted on the SPINWRITER.
2. Remove the cut-sheet feeder left and right covers.
3. On the left side, place one oscilloscope probe on the IC E, pin 4 on the connector PCB, and the other probe on IC D, pin 4 (Figure 6-43).
4. Turn on the power for the SPINWRITER.
5. Set the FORM LENGTH switch to 99 and press SET TOF.
6. Press the FF switch ten or more times.

NOTE

This step stores the form feed command in the data buffer and causes the cut-sheet feeder to operate continuously for the number of commands stored.

7. While the cut-sheet feeder is operating, watch the waveforms on the oscilloscope and adjust P2 on the connector PCB and P3 (Figure 6-43) for symmetrical waveforms (Figure 6-44).
8. Check the phase displacement of the two signals.

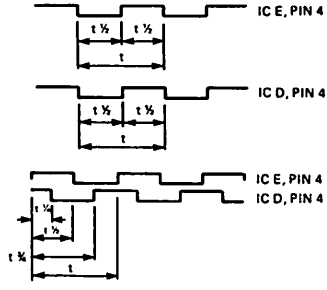


FIGURE 6-44: LIGHT BARRIER TIMING DIAGRAM

OPTIC SENSOR SENSITIVITY ADJUSTMENT

Perform this adjustment each time after the logic PCB is changed. The cut-sheet feeder does not have to be driven while making this adjustment.

1. Make sure the cut-sheet feeder is mounted in the SPINWRITER.
2. Remove the right cover.
3. Turn on the power for the SPINWRITER.
4. Place a voltmeter probe on IC C, pin 1 on the logic PCB and the other probe on ground (Figure 6-45).
5. Adjust potentiometer P1 on the logic PCB (Figure 6-45) for a voltage of 4.5 to 5 volts.

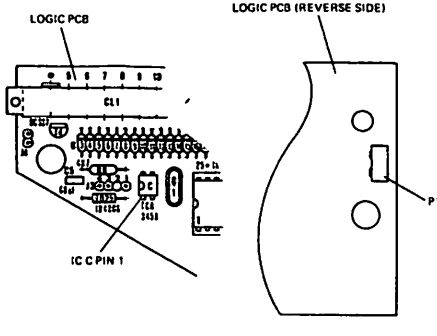


FIGURE 6-45: OPTIC SENSOR SENSITIVITY ADJ.

NOTES

Ensure that there is no paper under the photocell during measurement.

REMOVAL, REPLACEMENT, and REPAIR

INTRODUCTION

The procedures described in this section are presented in proper sequence for performing the required maintenance. In general, details are provided only for those items which:

1. Have difficult locations for attaching hardware
2. Must be removed or replaced in a prescribed order
3. Require specific techniques for removal or replacement

Procedures are omitted for items that can be removed and replaced using standard practices.

FORMS-TRACTOR ASSEMBLY

It is necessary to remove the Forms-Tractor prior to removing the Middle Cover.

REMOVAL

1. Turn POWER off and raise the top cover.
2. Move the pressure bail away from the platen.
3. Press the locking levers and raise the assembly upward and toward the rear of the printer to remove it.

REPLACEMENT

Reverse the removal procedure listed above.

CUT-SHEET FEEDER

REMOVAL

1. Turn off all power and unplug the AC power cord from the outlet.
2. Unplug the power cable from the cut-sheet feeder.
3. Grasp the cut-sheet feeder on both ends, press in on the left and right side lever bars (red pushbuttons) and remove the assembly from the platen shaft.

REPLACEMENT

Reverse the removal procedure.

MIDDLE COVER

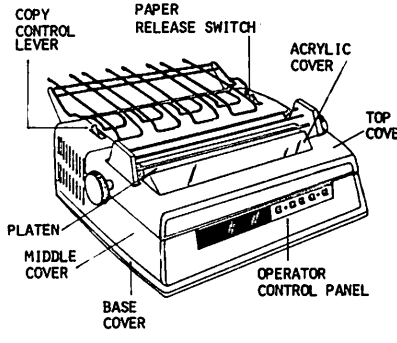


FIGURE 6-46: SPINWRITER COVERS

If the Cut-Sheet Feeder, or the Forms-Tractor options are installed, it must be removed prior to removing the Middle Cover.

REMOVAL

1. Open the top cover.
2. Pull the paper bail lever forward.
3. Unlock and remove the left and right lock levers of the tractor feed
4. Simultaneously push both left and right platen clamp lever arms and remove the platen.
5. Remove the ribbon cartridge.
6. Hold the cover sides with both palms, and, using the thumb, move the middle cover release levers in arrow direction A (Figure 6-41) and disengage from the lever plate.

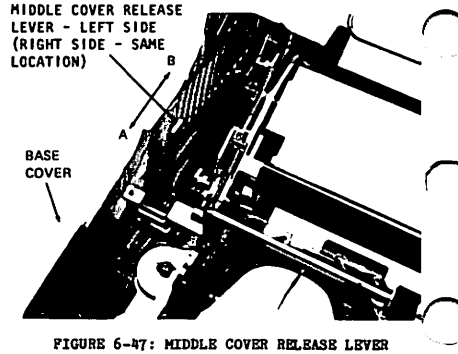


FIGURE 6-47: MIDDLE COVER RELEASE LEVER

7. Lift the cover off vertically and use care to prevent the cover from contacting any interior mechanism.

REPLACEMENT

1. Reverse the cover removal procedure, i.e., lift the top cover and holding the lever in the A direction with your thumb, lower the cover into position.

NOTE

Ensure that the lever is firmly engaged in the B direction with the lever plate.

2. Install the platen assembly. Ensure that it is properly seated by the platen clamp levers.
3. Install the tractor feed assembly.
4. Check that the copy control lever and paper release lever function without contacting the cover.
5. Ensure that the paper-out switch and cover-open switch are adjusted properly (Figure 6-48).

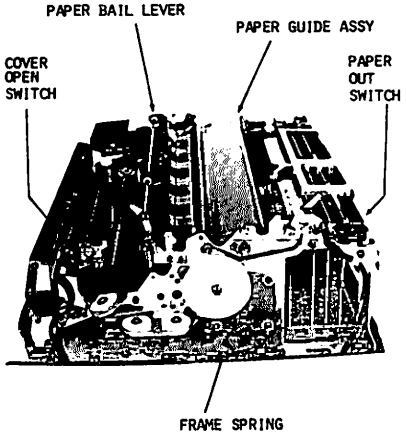


FIGURE 6-48: SPINWRITER WITH COVER REMOVED

CIRCUIT BOARDS

REMOVAL

1. Turn off power.
2. Disconnect the power cord.

CAUTION

Never remove or install a PCB when the power is ON.

3. Remove the middle cover.
4. Lift and remove the paper guide assembly.
5. Disconnect the cable connectors attached to the PCB (Figure 6-49).
6. Loosen the screws securing the PCB holder. Remove the holder.
7. Pull out the PCB.

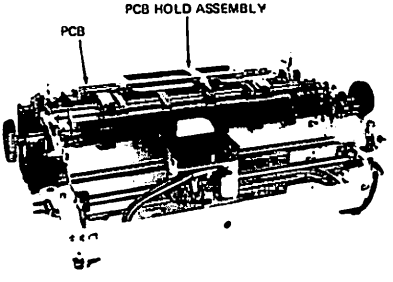


FIGURE 6-49: CIRCUIT BOARD ASSEMBLY LOCATION

REPLACEMENT

Reverse the removal procedure described above.

POWER SUPPLY

REMOVAL

1. Turn off all power and unplug the AC power cord from outlet.
2. Remove the middle cover.
3. Remove the paper guide assembly.
4. Remove the circuit boards as instructed in Circuit Board Removal section steps 5 thru 7.
5. For models with a keyboard, remove the keyboard ground straps.
6. Remove the plug and green ground wire to the fan.
7. Unplug all connectors from the mother board (CN1 thru CN5).

8. Refer to figure 6-50. Remove four screws securing the printer mechanism to the base and lift the mechanism out of the base.

9. Remove rear of chasis from base by removal of seven screws shown in Figures 6-45 and 6-46.

10. Remove power supply mounting screws (Figure 6-47) and lift power supply out the rear.

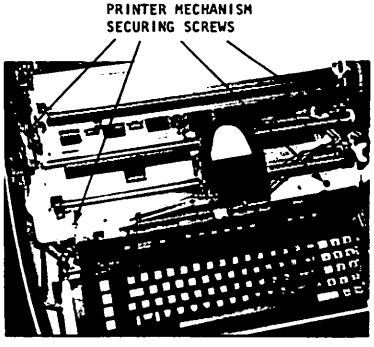


FIGURE 6-50: PRINTER BASE RETAINING SCREWS

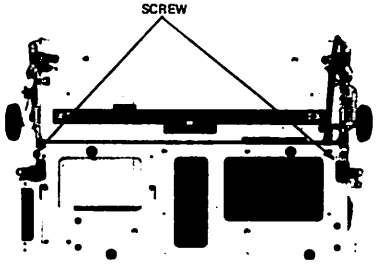


FIGURE 6-51: BASE CHASSIS (BOTTOM VIEW)

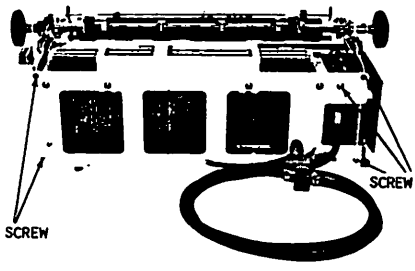


FIGURE 6-52: BASE CHASSIS (REAR VIEW)

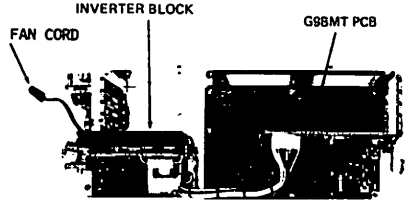


FIGURE 6-53: POWER SUPPLY (TOP VIEW)

REPLACEMENT

Reverse the removal procedure described in above.

CAUTION

Use special care when handling the connecting cord and fan cord to avoid any damage to these when performing the replacement procedures.

OPERATOR CONTROL PANEL

REMOVAL (Figure 6-54)

1. Turn off power and unplug power cord from outlet.

2. Remove the tractor assembly, platen and middle cover.

3. Disconnect ribbon cables (Items 1 & 2) from bottom of panel.

4. Disconnect power connector (Item 3).

5. Remove control panel assembly by removing four screws (Item 4) that secure brackets to base (refer to Figure 6-54).

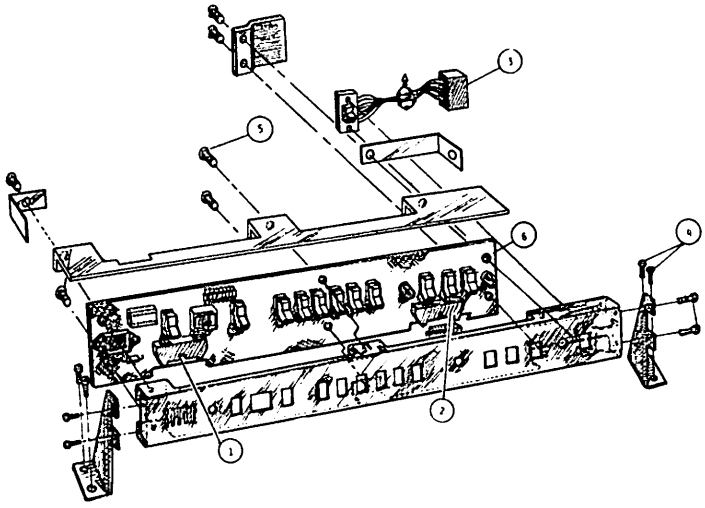


FIGURE 6-54: OPERATOR CONTROL PANEL

6. Remove six screws (Item 5) to detach control panel PCB (Item 6) from bracket assembly.

REPLACEMENT

Reverse the removal procedure described above.

CARRIAGE

NOTE

The Carriage Assembly is the most expensive mechanical unit on the SPINWRITER. Be sure all adjustments have been tried before replacing this assembly.

REMOVAL (Figure 6-55)

1. Turn off power and unplug power cord from outlet.
2. Remove the tractor assembly, platen and middle cover.
3. Remove the paper guide assembly.
4. Remove the ribbon cartridge and print thimble.
5. Disconnect the carriage assembly connector (CN4) from the mother board. (Refer to Figure 6-55.)
6. Disengage the carriage cable assembly from the cable clamps.
7. Remove three screws securing the carriage to the lower guide assembly (Figure 6-56).
8. Slightly lift and tilt the carriage assembly to the rear (DO NOT LIFT OUT YET). Slide the lower guide assembly to the extreme right while holding the carriage assembly in place.
9. Hold the wire rope back with one hand to keep the carriage free of the wire. Pull the carriage slightly forward to disengage the rear bearing and gently lift the carriage out of the unit.

REPLACEMENT

1. Move the lower guide assembly to extreme right.
2. Hold the wire rope back with one hand and lower the carriage assembly between the rails at the center of carriage travel.

NOTE

Ensure rear bearing sits on rear rail illustrated in Figure 6-56.

3. Slide the lower guide assembly under the carriage assembly and line up the screw holes. Ensure that alignment pins between the guide assembly and carriage are firmly seated.
4. Secure the carrige to the lower guide assembly with three screws (Figure 6-51).

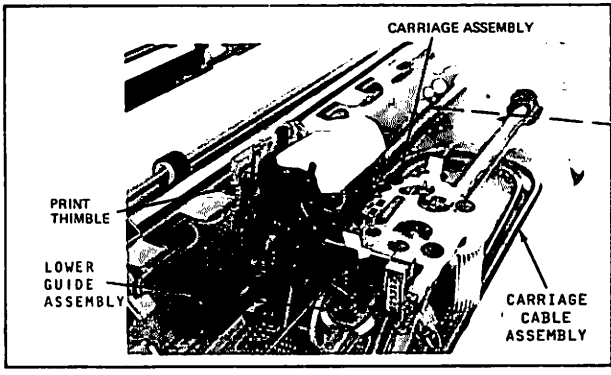


FIGURE 6-55: CARRIAGE LOCATION

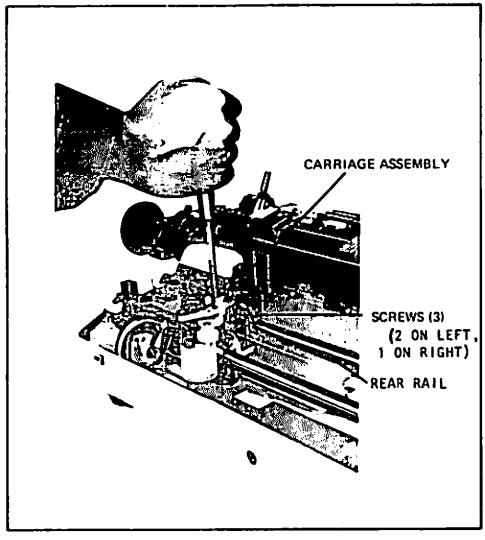


FIGURE 6-56: CARRIAGE REMOVAL

5. Move the carriage assembly to the extreme left. Engage the carriage cables in the clamps (Small and large clamp).

NOTE

Ensure that cable does not touch left side frame.

6. Secure connector CN4 to the mother board. This connector is keyed to assure proper pin alignment.

7. Perform the following checks and/or adjustments:

A) Hammer Adjustments.

B) Rotate Home Position Setting.

C) Ribbon Change Adjustments.

D) Card Holder Setting.

E) Platen Height.

F) First Print Position.

8. Reinstall the ribbon cartridge, print thimble, paper guide assembly and cover.

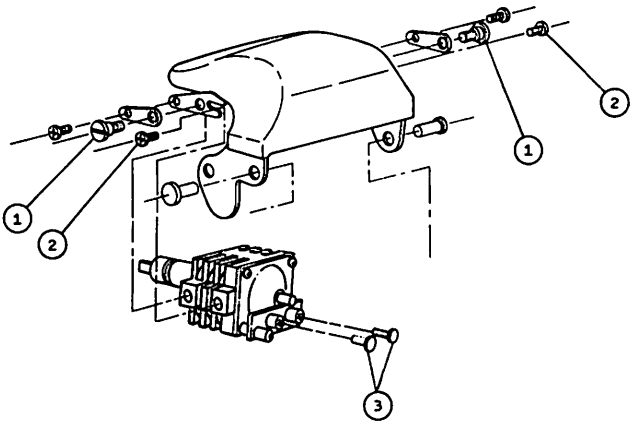


FIGURE 6-57: PRINT HAMMER DISASSEMBLY

PRINT HAMMER

REMOVAL

1. Turn off power and unplug power cord from outlet.
2. Open the top cover.
3. Remove the ribbon cartridge and print thimble.
4. Raise the hammer cover assembly.
5. Remove four screws (items 1&2) which secure the hammer to the hammer cover.
6. Remove two terminal head screws (item 3) illustrated in Figure 6-35.

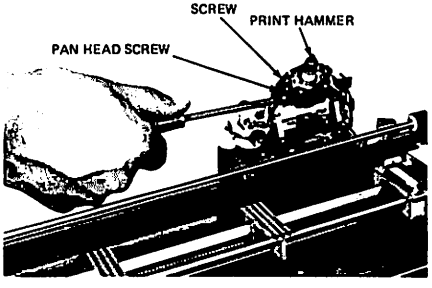


FIGURE 6-58: PRINT HAMMER REMOVAL AND ASSEMBLY

REPLACEMENT

1. Reverse the removal procedures.
2. Perform the Hammer Assembly Adjustments.

WIRE ROPE

NOTE

Replace wire ropes as a pair.

REMOVAL

1. Turn power off and unplug power cord from outlet.
2. Remove the tractor assembly, platen and middle cover.
3. Remove paper guide assembly.
4. Remove the bottom paper guide assembly.
5. Refer to Figure 6-59B. Loosen the nut (item 1) that locks the adjusting screw stud (item 2) on the left pulley bracket.
6. Loosen the wire rope tension by turning the adjusting screw counterclockwise.

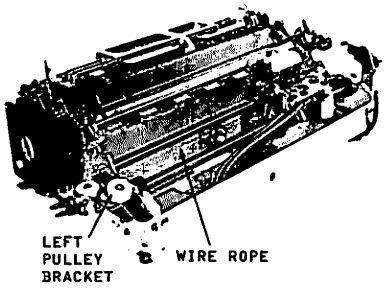


FIGURE 6-59: WIRE ROPE & ADJUST. SCREW LOC.

7. Refer to FIG 6-61A. Disconnect the right side wire at point A of the carrier assembly. Disengage the wire rope from right pulley 4,3,2,and 1, and leave the wire on the drive pulley.

8. Do the same with the left side wire disconnecting it at point B, and disengaging it from the left guide pulleys.

9. Gently pull the right side wire so it unwinds naturally from the drive pulley.

10. Do the same with the left side pulley.

REPLACEMENT

CAUTION

Do not kink the Wire Rope. Any kink in the Wire Rope will permanently damage it, by preventing proper adjustment.

1. Insert the knot in left side wire rope into the rear slot of the drive pulley (see Figure 6-61B).

2. Rotate the pulley CLOCKWISE and wind the wire starting in the second groove and around the pulley to the point illustrated in Figure 6-61C.

3. Insert the knot in right side wire rope into the front slot and put one complete turn on the drive pulley (Figure 6-61C).

4. Apply tension to the right wire rope and pull the left side wire rope until both wire ropes are centered (approx. 6 turns of each rope) on the drive pulley.

5. Set the winding jig on the drive pulley (see Figure 6-61D).

6. Check that the adjusting screw on the left pulley bracket is fully loosened as indicated in step 5 of the removal procedure.

7. Place the left side wire rope onto the four guide pulleys 1, 2, 3, 4, respectively and then attach the end loop of the wire to point B (refer to Figure 6-61A).

8. Place the right side wire rope onto the four guide pulleys 1, 2, 3, 4, respectively and then attach end loop of the wire to point A (refer to Figure 6-61A).

9. Turn the adjusting screw clockwise to tension the wire rope.

10. Perform the wire rope tension adjustment.

11. Install the middle cover.

SPACING MOTOR

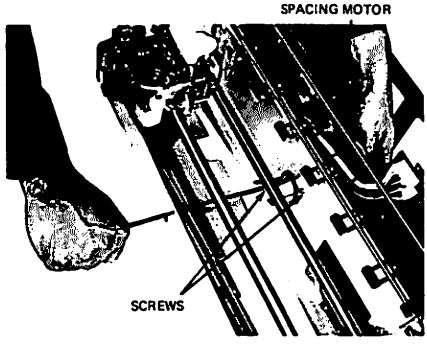


FIGURE 6-60: SPACING MOTOR REMOVAL

REMOVAL (Power Off)

1. Turn off power and unplug power cord from outlet.

2. Remove the tractor assembly, platen and middle cover.

3. Remove the paper guide assembly.

4. On models with bottom feed option, remove the bottom paper guide assembly.

5. Remove the operator control panel.

6. Remove the wire ropes.

7. Remove the PCB card guide by loosening two screws.

8. Remove the PCBs from the mother board.

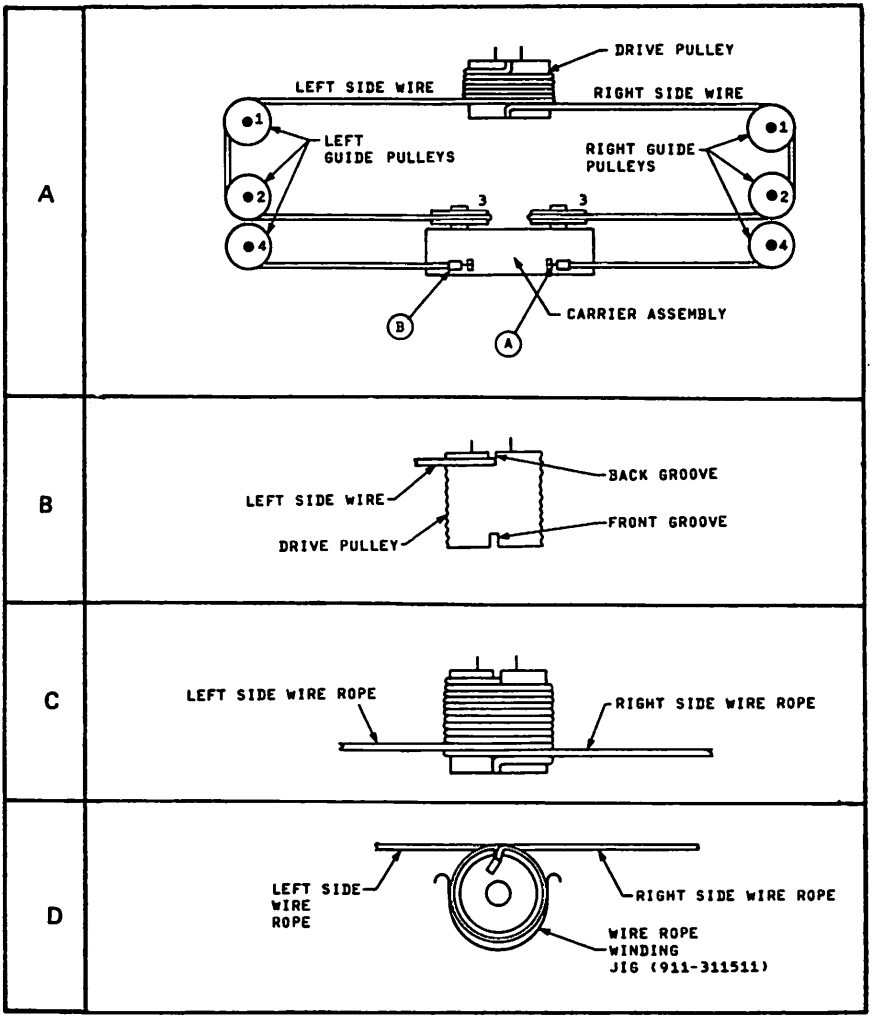


FIGURE 6-61: WIRE ROPE ASSEMBLED AND DISASSEMBLED

9. Disconnect the spacing motor cable connector CN13 from the mother board.

10. Refer to Figure 6-57. Remove four screws securing the printer mechanism to the base and lift the mechanism out of the base.

11. Remove the spacing motor assembly by removing two screws illustrated in Figure 6-60.

REPLACEMENT

1. Reverse the removal procedures.

2. Perform the wire rope tension adjustement.

CUT-SHEET FEEDER REMOVAL AND REPLACEMENT PROCEDURES

The procedures described are presented in proper sequence for performing the required removal and replacement. To replace the items, perform the removal procedure in reverse order. If additional steps are necessary during replacement (such as adjustments), they are listed.

When performing the removal and replacement procedures that require tightening the lock collar setscrews, ensure that the setscrews are between the slits of the gear wheels or slotbushings and between the nuts of the shafts (Figure 6-62).

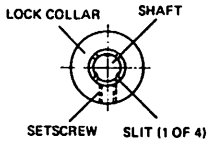


FIGURE 6-62: SET SCREW POSITIONING

LEFT COVER REMOVAL

1. Remove the two screws from the left side (Figure 6-63A).

2. Slide off the left cover, ensuring it clears the red lever bar (pushbutton).

Right Cover Removal

1. Remove the interface cable connector(see Figure 6-63B).

2. Pry off the forms length slide switch with a flattipped screwdriver.

3. Remove the two screws from the right side.

4. Slide off the right cover, ensuring it clears the red lever bar (pushbutton)

PROFILE (COVER) REMOVAL PROCEDURES

The cut-sheet feeder contains three profile (covers): the front profile, the center profile (cover), and the main profile (Figure 6-64). One or several of these profile (covers) may have to be removed to get inside the cut-sheet feeder.

Front Profile (Cover) Removal

1. Remove the left and right covers.

2. Remove the two front profile (cover) small slot head mounting screws (one on each side).

3. Lift the front profile (cover) up and toward the rear of the cut-sheet feeder.

Center Profile (Cover) Removal

1. Remove the left and right covers.

2. Disconnect the plug from J3 (sensor PCB connector) on the logic PCB.

3. Remove the four center profile (cover) small slot head mounting screws (two on each side).

4. Remove the center profile (cover) through the bottom of the cut-sheet feeder.

CAUTION

When reinstalling the center profile (cover), be sure that the sensor PCB cable is inserted correctly, otherwise it may be damaged.

Main Profile (Cover) Removal

1. Remove the left and right covers.

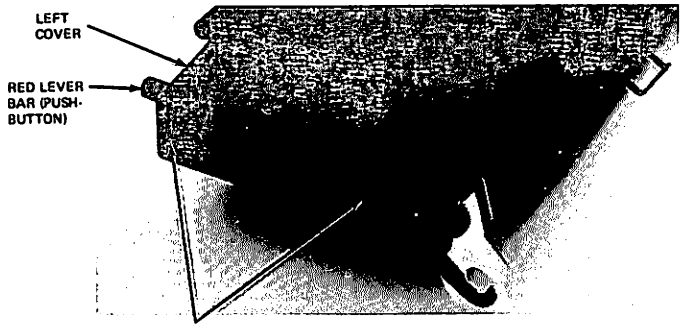
2. Remove the logic PCB.

3. Remove the two plugs from the connector PCB.

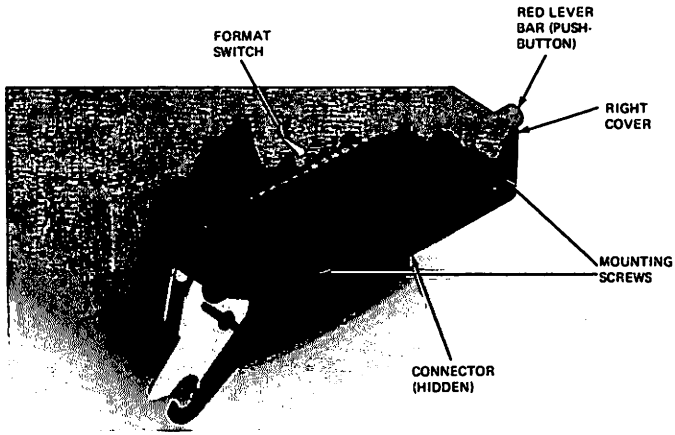
4. Press down on the pressure bar.

5. Remove the main profile (cover) small slot head head mounting screws.

6. Remove the main profile (cover).



LEFT SIDE
A



RIGHT SIDE
B

FIGURE 6-63: COVER REMOVAL DIAGRAM

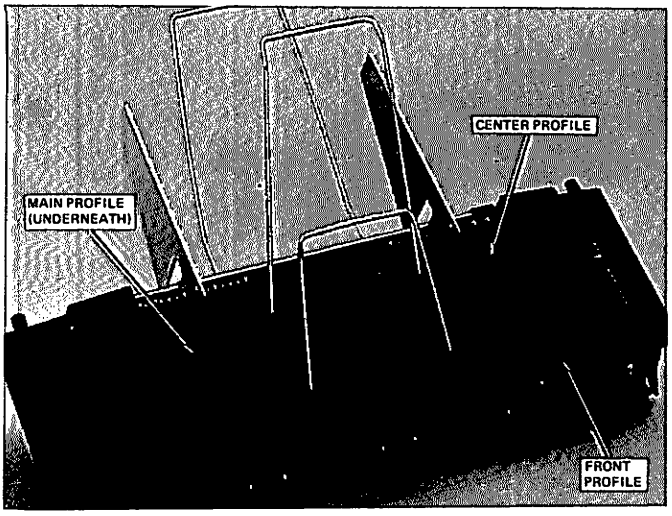


FIGURE 6-64: PROFILE REMOVAL DIAGRAM

Logic PCB Removal

1. Remove the right cover.
2. Remove the two screwbolts (Figure 6-65) using a 7 mm wrench or adjustable wrench.
3. Remove the right supporting plate.
4. Remove the plastic socket (white spacer).
5. Remove the sensor PCB connector.
6. Remove the retaining screw.
7. Remove the logic PCB.

Connector PCB Removal

1. Remove the logic PCB.
2. Remove the main profile (cover).
3. Slide the connector PCB out of the main profile (cover).

Sensor PCB Removal

1. Remove the center profile (cover).
2. Remove the tubular rubber retainer imbedded in the rear of the main profile (cover).
3. Remove the sensor PCB.

NOTE

When replacing the tubular rubber retainer, be sure it is deeply embedded into the center profile (cover) groove.

Indicator Lamp Replacement

1. Remove right cover.
2. Lift lamp up slightly and remove it (Figure 6-65 for lamp location)
3. Insert new lamp and install right cover.

Solenoid Removal

1. Remove left cover.
2. Remove the solenoid connector from the connector PCB (Figure 6-66).
3. Loosen the lock collar setscrew using a 2 mm setscrew wrench.
4. Remove the two screwbolts using a 7 mm wrench.
5. Remove the left supporting plate and solenoid (both parts are attached).

NOTE

Ensure that the lock collar and ball bearing are maintained in position.

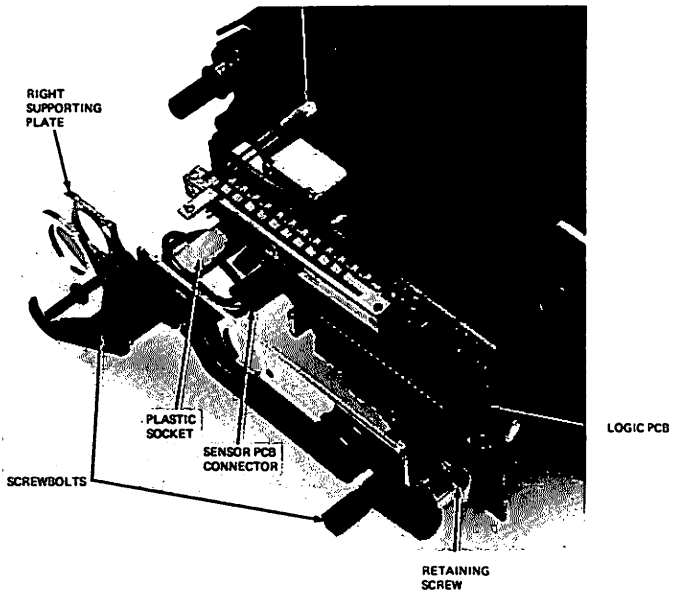


FIGURE 6-65: LOGIC PCB & INDICATOR LAMP REPLACEMENT

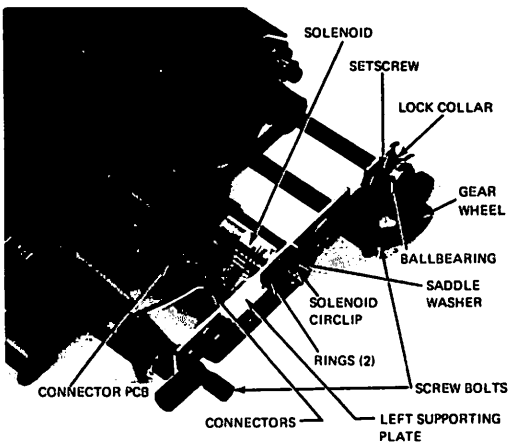


FIGURE 6-66: SOLENOID REMOVAL DIAGRAM

6. Remove solenoid circlip, saddle washer, and two rings.

NOTE

The saddle washer creates a load pressure; therefore, be careful that the circlip and saddle washers are not lost when removing the circlip.

7. Remove the solenoid.

NOTE

When installing the solenoid, ensure that it meshes with the detector disk slot socket. Also be sure to center the lock collar between the two sides of the left supporting plate before tightening the setscrew.

Detector Disk And Timing Belt Removal

1. Remove the solenoid.
2. Loosen the lock collar setscrew with a 2 mm setscrew wrench (Figure 6-67).
3. Remove the detector disk and slot socket (inside he detector disk).
4. Separate the detector disk and slot socket.
5. Remove the timing belt.

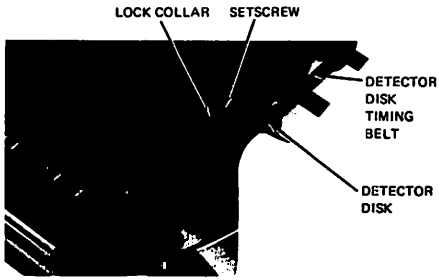


FIGURE 6-67: DECTECTOR DISK TIMING BELT DIAGRAM

PROFILE (COVER) SHAFT PULLEY BELT REMOVAL

The profile (cover) shaft pulley belt can be removed by first removing the logic PCB and then slipping the belt off the profile (cover) shaft pulley.

PAPER GUIDE REMOVAL

1. Remove rear bow if installed.
2. Remove left and right covers.
3. Remove one of the two black plastic buttons form the pressure bar (Figure 6-68) and slide the bar out.
4. Remove the C-clip from the shaft.
5. Loosen the two attachment screws (knurled thumbwheel screws) on the left and right paper guides.
6. Slide the shaft out.
7. Slide each of the paper guides to the extreme ends.
8. Pull out and remove one of the paper guides from the rear of the cut-sheet feeder.
9. Remove the scale bar.
10. Remove the second paper guide.

PROFILE (COVER) RUBBER REMOVAL

1. Remove the left and right paper guides.
2. Remove the logic PCB.
3. Loosen the two setscrews on the profile (cover) shaft (Figure 6-69)
4. Slide the profile (cover) shaft to the left and remove the two profile rubbers.
5. Install the new profile (cover) rubbers.
6. Insert the profile (cover) shaft through the ballbearings, install the collar and lock collar setscrews.
7. Ensure that the toothed belt is installed.
8. Install the logic PCB.
9. Install the paper guides and scale bar.
10. Install the shaft.
11. Install the C-clip in the shaft slot.
12. Install the pressure bar and black plastic button.

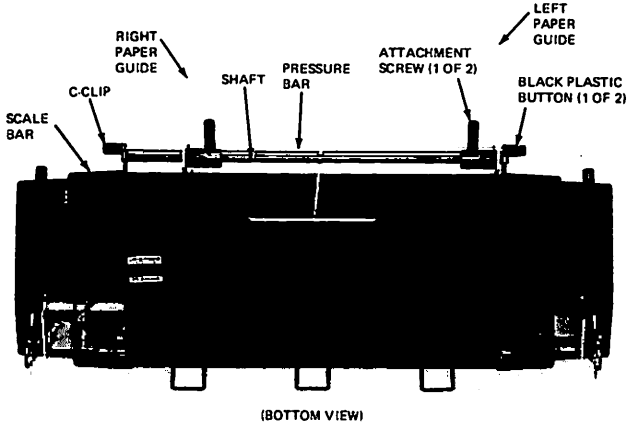


FIGURE 6-68: PAPER GUIDE REMOVAL DIAGRAM

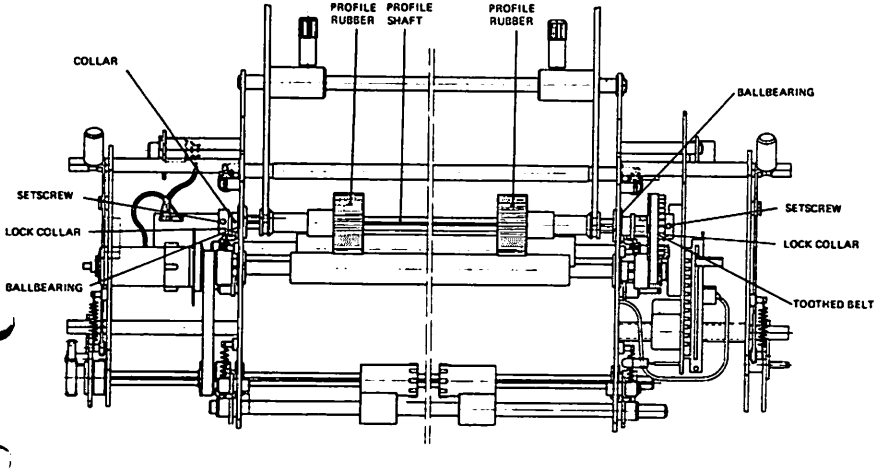


FIGURE 6-69: PROFILE RUBBER REMOVAL DIAGRAM

CHAPTER 7
PARTS

INTRODUCTION

This chapter is the illustrated parts breakdown for the SPINWRITER. All figure item numbers are ballooned on the applicable exploded view. The items represent the engineering drawing bill of material and since not all items are called out, certain numbers are not used.

MECHANICAL ILLUSTRATED PARTS BREAKDOWN

The mechanical illustrated parts breakdown parts list is arranged in four columns:

1. ITEM - Contains the item number referred to in the callouts on the exploded view.

2. PART NUMBER - Contains the NEC part number used when ordering spares.

NOTE

PREFIX "#NEC" to all part numbers when ordering parts from FPS.

3. DESCRIPTION - Contains a brief description of the part. Parts and assemblies are listed followed by the attaching hardware. Screws, nuts, and washers are metric, and are described in coded form (see example).

4. QUANTITY - Contains the number of items per assembly.

EXAMPLE OF DESCRIPTION CODE

```
CPIMSx3x6x15BF
 |    | | |
 |    | | |
 A    B C D
```

This is a galvanized pan-head metric screw with a nominal diameter of 3mm and the length of 6 mm with phillips head. If the description is prefixed with one or two characters followed by a dash (i.e. L-CPIMS) refer to E.

The code means as follows:

A) First 5 letters, at the beginning.

```
CP(_)MS : Phillips, pan-head screw.
CF(_)MS : Phillips, flat-head screw.
AHEX(_)N : A type hex nut
BHEX(_)N : B type hex nut
S(_)WA   : Small washer
P(_)WA   : Polished washer
#2(_)LWA : Spring washer
```

The character in the position indicated by a (_) shows the material the object is made of:

```
I = Iron
B = Brass
ST = Spring Steel
```

B) Number following the first code is the nominal diameter in millimeters.

C) The next number, shows the nominal length in millimeters.

D) The last code indicates the finishing applied to the parts.

15BF = Galvanization, lustrous coloration, chromate finishing.

3GF = Lustrous nickle-plating finish.

E) SEMUSU screw is always a screw provided with a washer.

The first 7 or 8 letters of the description code mean:

L-CP(_)MS Phillips, pan-head screw, with spring washer.

P-CP(_)MS Phillips, pan-head screw, with polished washer.

S-CP(_)MS Phillips, pan-head screw, with small washer.

PL-CP(_)MS Phillips, pan-head screw, with a spring & polished washer.

SL-CP(_)MS Phillips, pan-head screw, with a spring & small washer.

Only major assemblies of the SPINWRITER, and their immediate breakdowns, are included in this chapter. The complete Illustrated Parts Breakdown is on micro-fiche.

SPINWRITER PRINTED CIRCUIT BOARDS

G9DWH	Interface/Processor	136-430989-A
G9CUN	Servo Board	136-~~430874~~-A 430874
G9CUM	Driver Board	136-~~430873~~-A 430873
G9CUL	Mother Board	136-450872-A
G9DGD	Control Panel	135-~~490935~~-A 440935
G9GBP	Regulator Board	135-44186-A
G9BMT	Regulator Board	136-430570-A

(G9GBP superceeds the G9BMT)

The completed Illustrated Parts Breakdown for the Cut-Sheet Feeder option is also located on micro-fiche.

The Cut Sheet Feeder option (KIT4248-002) contains the following parts:

158-908908-908	Cut Sheet Feeder
136-723721-A	Acrylic Cover
158-000006-050-A	Paper Guide
158-159103-908	Interface Cable
136-431186-A	G9GBP Power Supply Regulator
803-070031-003	Nylon Cable Restraint

136-031570-GRP-A Receive Only Model

ITEM	PART NUMBER	DESCRITPTION	QTY	
1	136-031559-001-A	Control Unit Assembly (See F7-7 for brkdwn)	1	
2	136-031572-A	Carriage Unit (See F7-2 for brkdwn)	1	
3	136-031580-A	Frame Unit (See F7-3 for brkdwn)	1	
4	136-031561-102-A	Power Supply (See F7-4 for brkdwn)	1	
5	136-031586-001-A	Platen Assy (See F7-5 for brkdwn)	1	
6	136-031587--A	Pressure Bail Assembly (See F7-10 for brkdwn)	1	
10	136-031592-001-A	ROP Housing Assy (See F7-6 for brkdwn)	1	
14	803-020004	Print Thimble	1	
20	136-031562-001-A	Operator Cntrl Panel (See F7-9 for brkdwn)	1	
25	136-040572-001-A	Serial Interface Cbl (See F7-8 for brkdwn)	1	
26	136-700655-A	Name Plate	1	
27	805-300004-010-0	PL-CPIMSx4x10x15BF	2	
28	805-300004-012-0	PL-CPIMSx4x12x15BF	2	
	136-031595-A	Vertical Tractor Assembly (See 7-11 for brkdwn)	1	NOT SHOWN
	136-031597-001-A	Paper Net Assembly (See 7-12 for brkdwn)	1	NOT SHOWN
	158-908908-908	Cut-Sheet Feeder	1	NOT SHOWN

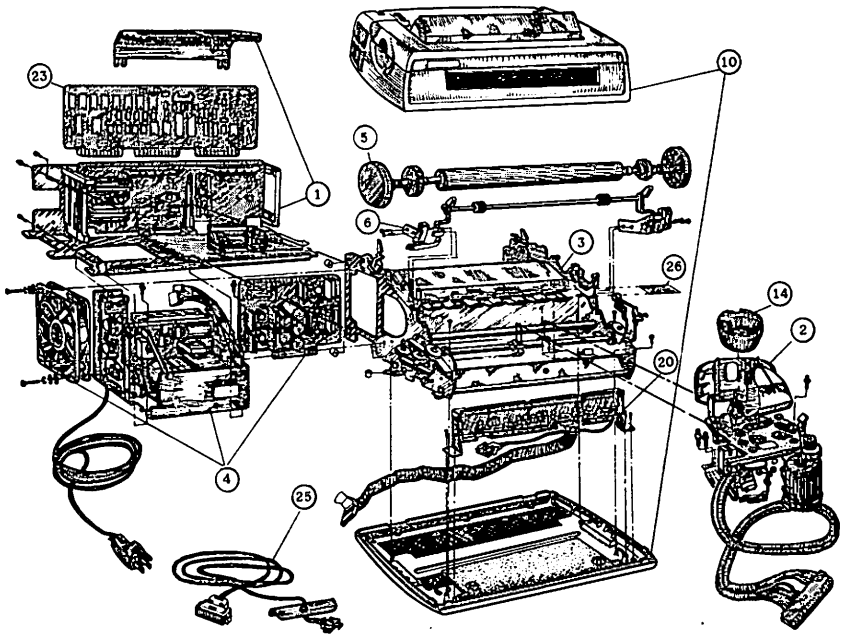


FIGURE 7-1: RECEIVE ONLY MODEL

136-031572-002-A Carriage Unit

Item	Part Number	Description	Qty
1	136-031573-B	Rotate Motor Assy	1
2	136-031577-A	Vertical Slide Sleeve Assy	1
3	136-031575-002-B	Ribbon Base Assy	1
4	136-032022-B	Print Hammer Assy	1
6	136-722866-A	Pivot Screw	1
7	136-720287-A	Bearing Holder Assy	1
8	136-710139-A	Stud	2
9	136-720250-A	Spring (Bearing Holder)	1
10	136-711966-A	Lock Lever	1
11	136-711967-A	Eccentric Stud	1
12	136-711968-A	Lock Lever Guide	1
13	136-720254-A	Lock Lever Guide	1
14	136-720571-A	Card Holder Assy	1
15	136-720288-A	Hammer Cover Assy	1
16	136-712201-A	Position Plate	2
17	136-723810-A	Shoulder Screw	2
18	136-722836-A	VT Spring	1
19	808-802002-303-0	Socket Screw	2
20	808-814004-923-A	IB Tie	3
21	805-300025-005-0	PLCPIMSx2.5x5x5BF	4
22	805-300003-008-0	PL-CPIMSx3x8x15xBF	
23	805-310003-008-0	SL-CPIMSx3x8x15BF	3
24	805-330002-004-0	L-CPIMSx2x4x15BF	2
25	136-031579-002-A	Carriage Cbl Assy	1
26	136-723807-A	Cbl Clamp A	1
27	136-723805-A	Inductosyn Cover	1
28	136-700608-001-A	Unit Label	1
29	136-723814-A	Cbl Cover	1
30	136-723826-A	Cbl Clamp B	1
31	136-725752-A	Spacer A	1
32	136-725750-A	Carrier FG Cbl	1
33	136-726414-A	Stopper Assy	1
34	136-726418-002-A	Shim	3
35	805-300003-018-0	PL-CPIMSx3x16x15BF	1
36	805-300003-012-0	PL-CPIMSx3x12x15BF	1
37	808-300003-010-0	PL-CPIMSx3x10x15BF	1

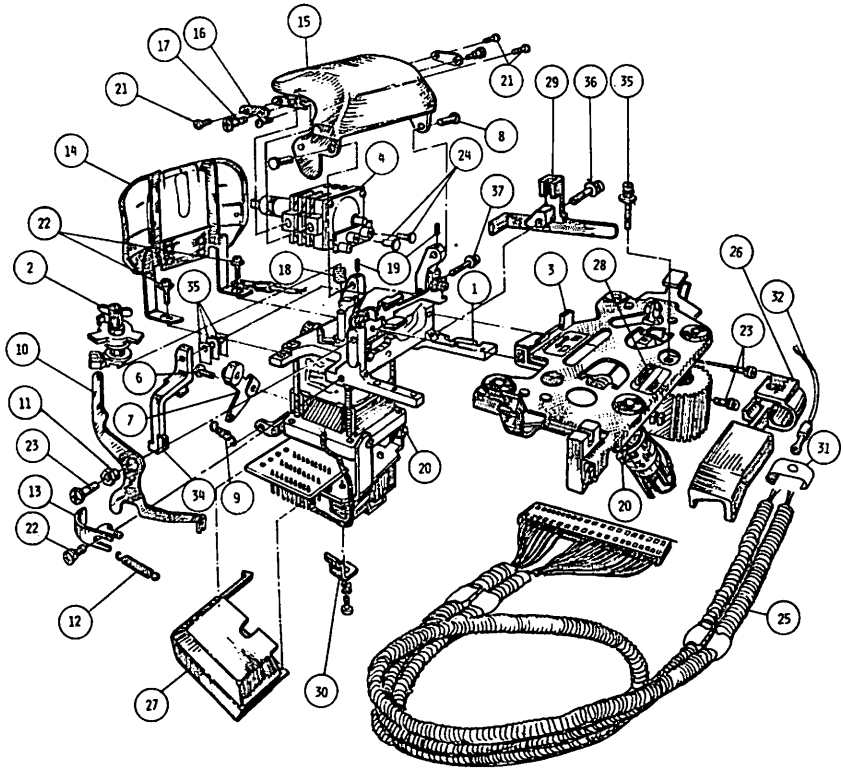


FIGURE 7-2: CARRIAGE UNIT

136-031580-001-A Frame Unit

Item	PartNumber	Description	Qty
1	136-031581-A	Frame Assy	1
2	136-031583-A	Spacing Motor Assy	1
3	136-031584-001-A	Wire Rope Assy	2
4	136-031585-A	Line Feed Motor Assy	1
5	136-722871-001-A	Line Feed Frame Assy	1
6	136-722871-002-A	Line Feed Frame Assy	1
7	136-723002-A	Pressure Assy	1
8	136-722873-A	Pressure Lever Assy	1
9	136-722872-A	Cntrl Lever Assy	1
10	136-722720-A	Line Feed Idler gear Bushing	1
11	136-722721-A	Line Feed Idler Gear	1
12	136-722756-A	Paper Guide Assy	1
13	136-722741-A	Cntrl Shaft	1
14	136-722743-A	Cntrl Arm	1
15	136-722740-A	Cntrl Cam	2
16	136-722742-A	Cntrl Follower Plate	2
17	136-722746-A	Detent Spring	1
18	803-010030-050-0	E Ring	2
19	136-722723-A	P Gap Adjuster	2
20	136-722715-A	Line Feed Height Adjuster	2
21	136-722714-A	Line Feed Slide Bushing	2
22	136-723435-001-A	Platen Clmp Lever	1
23	136-723435-002-A	Platen Clamp Lever	1
24	136-710035-A	Eccentric Bushing	2
25	136-723969-A	Platen Clamp Spring	3
26	136-720390-A	Line Feed Frame Spring	1
27	803-010030-032-0	E Ring	1
28	136-722885-A	Switch Assy	1
29	136-722888-B	Media Low (Net) Assy	1
30	803-070031-003-0	Nylon Clip HP-3N	2
31	803-070031-004-0	Nylon Clip HP-4N	2
35	805-300003-008-0	PL-CPIMSx3x8x15BF	4
36	805-300003-006-0	PL-CPIMSx3x6x15BF	2
37	805-300003-010-0	PL-CPIMSx3x10x15BF	1
38	805-300004-010-0	PL-CPIMSx4x10x15BF	3
39	805-300006-030-0	PL-CPIMSx6x30x15BF	1
40	805-330003-007-0	L-CPIMSx3x7x15BF	4
41	805-330004-008-0	L-CPIMSx4x8x15BF	2
42	805-310003-008-0	SL-CPIMSx3x8x15BF	2
43	805-050004-012-0	HEXIMSx4x12x15BF	1
44	805-050004-016-0	HEXIMSx4x16x15BF	1
45	805-620004-0	#2STLWAx4x15BF	2
46	805-330004-010-0	L-CPIMSx4x10x15BF	4
47	805-610004-0	PIWAx4x15BF	2
48	136-723971-001-A	FG Plate (Paper Guide)	1
49	136-723971-002-A	FG Plate (Paper Guide)	1
50	136-700665-A	Frame Label	1
51	136-727017-A	Special Spacer	2
52	136-727038-A	Spacer	4
53	805-610003-0	PIWAx3x15BF	2
54	805-620003-0	#2STLAx3x15BF	2
55	805-500003-0	AHEXINx3x15BF	2

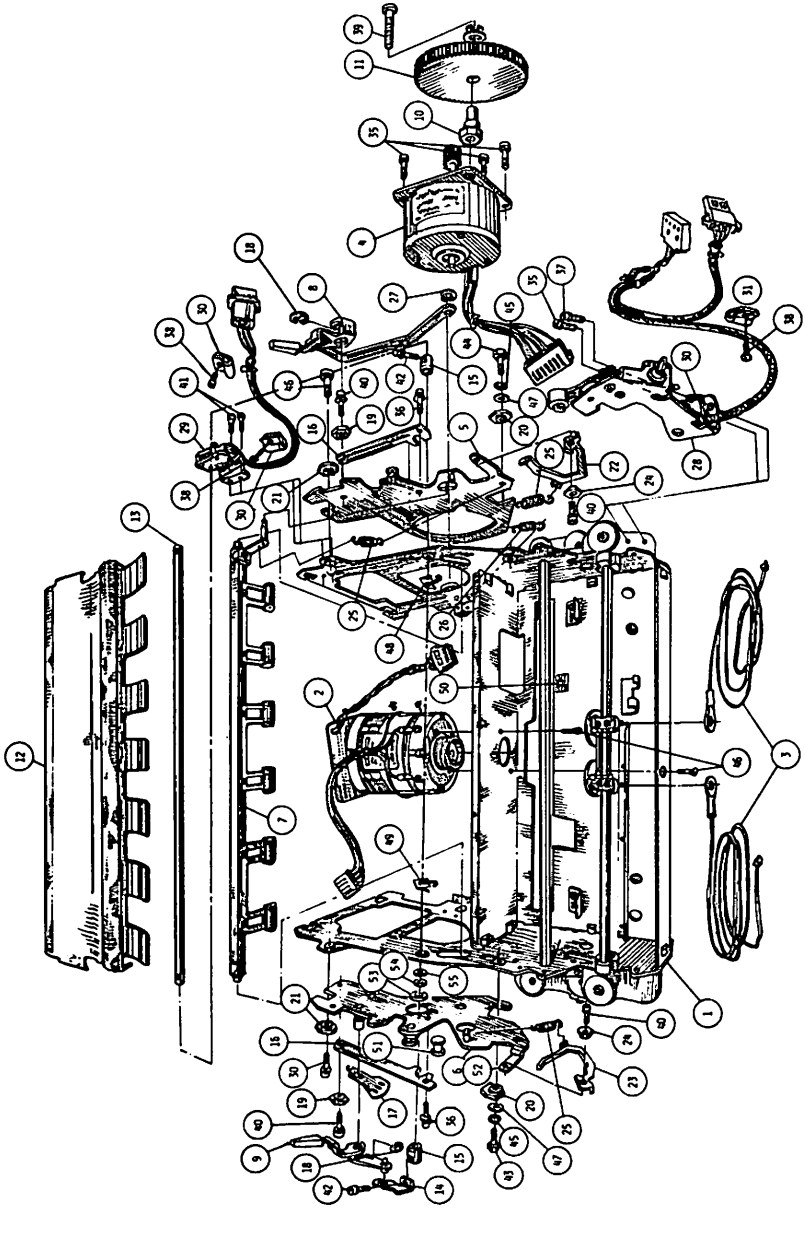


FIGURE 7-3: FRAME UNIT

136-031561-102-A Power Supply Assembly

Item	Part Number	Description	Qty
1	804-020198-002-B	Inverter Block	1
2	136-430570-A	G9BMT PCB Assy	*
2	136-431186-A	G9GBP PCB Assy	*
3	804-020247-002-A	Fan	1
4	136-040477-A	Pwr Cbl Assy	1
5	136-031431-A	Fan Cbl Assy	1
6	808-814007-A	Cbl Clamper	1
10	805-501103-0	AHEXBNx3x3GF	4
11	805-001103-008-0	CPBMSx3x8x3GF	3
12	805-622103-0	#2STLAx3x3GF	7
13	805-601103-0	SBWAx3x3GF	7
14	136-723218-B	Fuse Cover	1
15	808-960301-002-A	Fuse	1

The G9GBP has replaced the G9BMT. The G9GBP is the heavy duty version of the G9BMT.

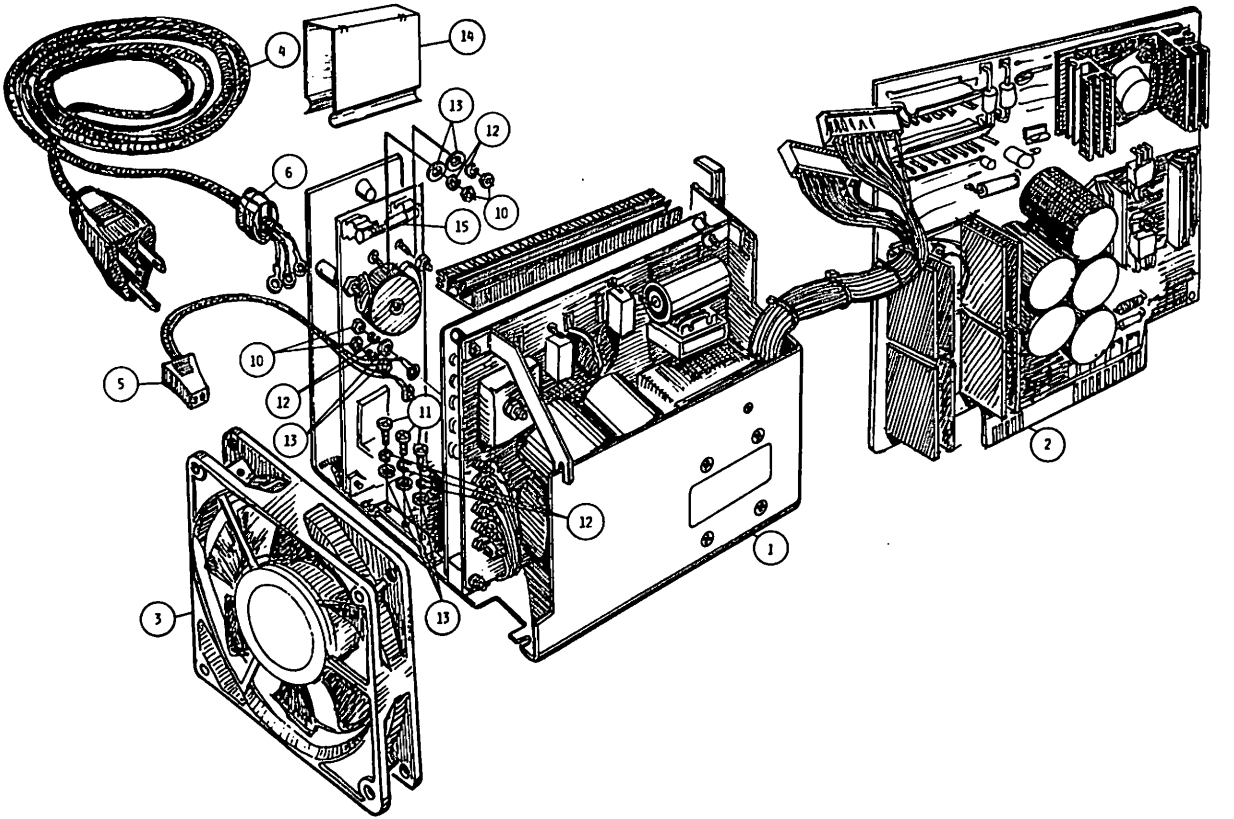


FIGURE 7-4: POWER SUPPLY ASSEMBLY

136-031586-001-A Platen Assembly

Item	Part Number	Description	Qty
1	136-722778-A	Platen Bushing L	1
2	136-722779-A	Platen Bushing R	1
3	136-722777-A	TR Drive Gear	1
4	136-724225-A	Gear Guide	1
5	136-710011-A	Platen Gear	1
6	136-722782-A	Adjuster	1
7	136-710021-009-A	Knob Mold	2
8	803-010034-032-O	Retaining Ring	1
9	136-710012-A	Platen Gear Spring	1
10	808-802002-404-O	Socket Screw	4
11	805-330004-010-O	L-CPIMSx4x10x15BF	2
12	803-010032-010-O	Retaining Ring	2
13	136-722785-A	Platen	1

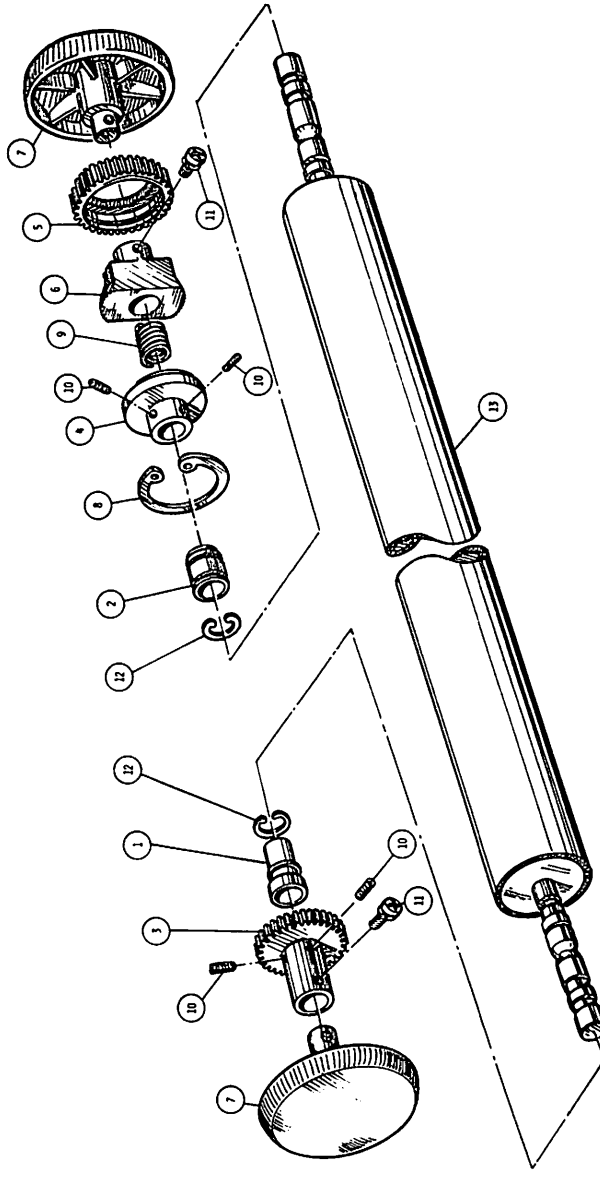


FIGURE 7-5: PLATEN ASSEMBLY

136-031592-001-A ROP Housing Assembly

Item	Part Number	Description	Qty
1	136-722706-001-A	ROP Base Assy	1
2	136-722707-001-A	ROP Middle Cover Assy	1
3	136-722708-001-A	Top Cover Assy	1
4	136-722660-011-A	Arm Assy	1
5	136-722660-012-A	Arm Assy	1
6	136-722664-001-A	Lever Assy	1
7	136-722664-002-A	Lever Assy	1
8	136-722668-A	Lever Plate	2
9	136-722672-B	Roller Assy	2
10	136-722676-001-A	Hinge Assy	1
11	136-722676-002-A	Hinge Assy	1
12	136-722670-002-B	Leaf Spring	2
13	136-722679-A	Rubber Foot	4
14	136-721830-A	Handle	1
15	136-721816-001-A	Reverse Guide	1
16	136-721816-002-A	Reverse Guide	1
17	136-722682-A	Dust Cover	1
18	136-723454-A	Dust Damper Q	1
19	136-723270-A	Acrylic Cover	1
20	136-723458-001-A	Leaf Spring B	1
21	136-723458-002-A	Leaf Spring B	1
22	805-300004-010-0	PL-CPIMSx4x10x15BF	32
23	805-010003-006-0	CPIMSx3x6x15xBF	3
24	805-300003-006-0	PL-CPIMSx3x6x15BF	8
28	136-700608-002-A	Unit Label	1

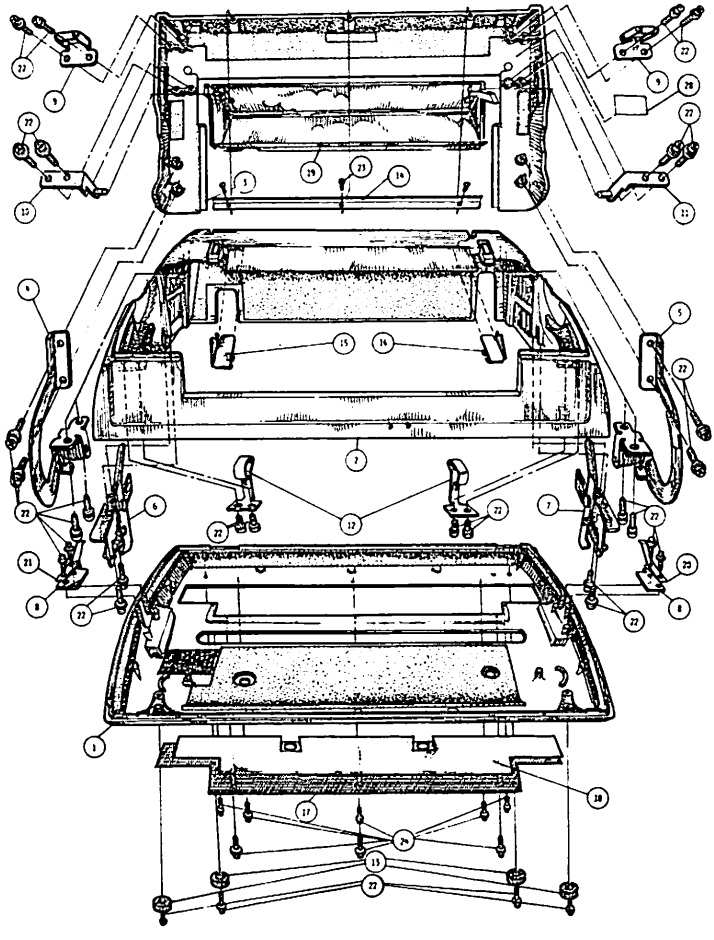


FIGURE 7-6: ROP HOUSING ASSEMBLY

136-031559-002-A Control Unit Assembly

Item	Part Number	Description	Qty
1	136-031560-001-A	Cntrl Frame Assy	1
2	136-430873-A	G9CUM PCB Assy	1
3	136-430874-A	G9CUN PCB Assy	1

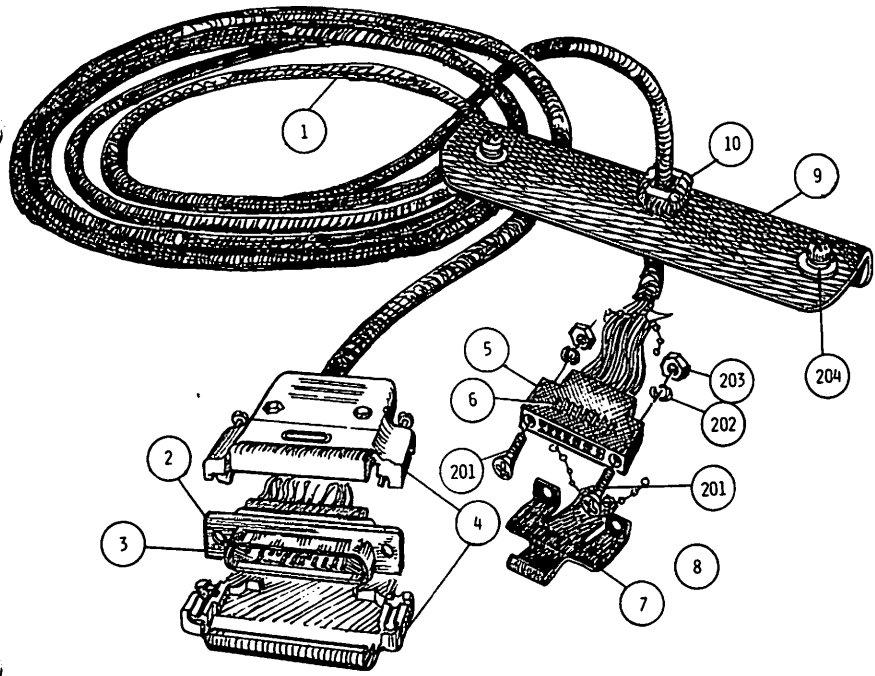


FIGURE 7-8: SERIAL INTERFACE CABLE

136-031562-GRP-A* Operator Control Panel Assembly

Item	Part Number	Description	Qty
1	136-430935-A	G9DGD PCB Assembly	1
2	136-721826-B	Operator Panel A	1
3	136-721827-A	Operator Panel Seal	1
4	136-721829-001-A	Operator Panel Bracket	1
5	136-721829-002-A	Operator Panel Bracket	1
6	136-040570-A	Pwr Switch Assy	1
7	136-721832-A	Switch Protector	1
8	136-720350-B	Decor Sheet	1
9	808-814005-A	IB Tie	1
10	136-723267-A	Seal Supporter Assy	1
11	136-723456-A	Strap Plate A	1
12	136-723457-A	Strap Plate B	1
13	136-721831-001-A	Operator Panel Window	1
14	136-040569-001-A	Connection Cable	1
15	136-040810-A	Cable	1
201	805-300004-010-0	PL-CPIMSx4x10x15BF	8
202	805-300002-006-0	PL-CPIMSx2x6x15BF	2
204	805-310003-010-0	SL-CPIMSx3x10x15BP	2
205	805-300003-008-0	PL-CPIMSx3x8x15BF	6

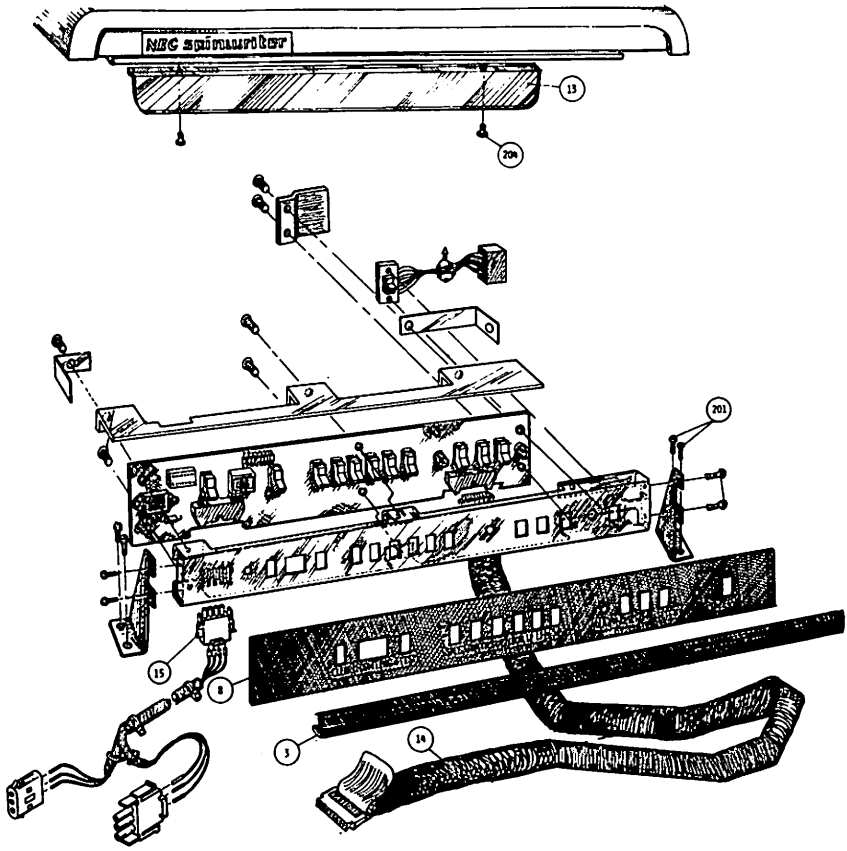


FIGURE 7-9: OPERATOR CONTROL PANEL

136-031587-A Pressure Bail Assembly

Item	Part Number	Description	Qty
1	136-720122-001-A	Bail Plate Assembly	1
2	136-720122-002-A	Bail Plte Assembly	1
3	808-805000-A	Bail Roller Assembly	2
4	136-710332-A	Bail Spring	2
5	136-722896-001-A	Bail Arm Assy	1
6	136-722896-002-A	Bail Arm Assy	1
7	803-010030-032-0	E Ring	2
8	808-802006-050-0	Grip Ring	2
9	805-300003-006-0	PL-CPIMSx3x6x15BF	4
10	136-722769-A	Bail Shaft	1

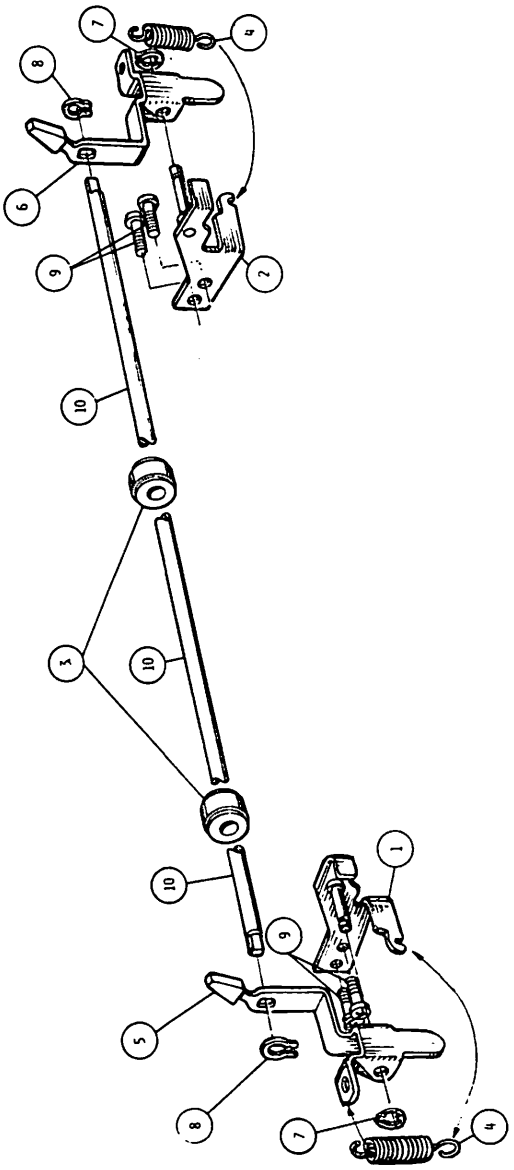


FIGURE 7-10: PRESSURE BAIL ASSEMBLY

136-031595-A Vertical Type Tractor Feeder

Item	Part Number	Description	Qty
1	804-041369-001-A	Tractor Assy, Right Hand	1
2	804-041369-002-A	Tractor Assy, Left Hand	1
3	136-724624-001-A	TR Side Frame Assy, Left	1
4	136-724624-002-A	TR Side Frame Assy, Right	1
5	136-724627-A	Right TR Cover	1
6	136-724628-A	Left TR Cover	1
7	136-722764-A	Drive Shaft	1
8	136-727434-A	Support Shaft	2
9	136-722759-A	Driven Gear	1
10	136-724629-A	Idler Gear	1
11	136-724630-A	Lock Screw	1
12	136-724634-A	Lock Piece	1
13	136-724632-A	Idler Gear Bushing	1
14	136-724633-A	Center Guide	1
15	136-722879-A	Spring (Platen Clamp)	2
201	803-010030-040-A	E-40	1
202	805-300004-008-0	PL-CPIMSx4x8x15BF	4
203	805-300103-008-0	PL-CPIMSx3x8x3GF	7
204	803-330003-006-0	L-CPIMSx3x6x15BF	1

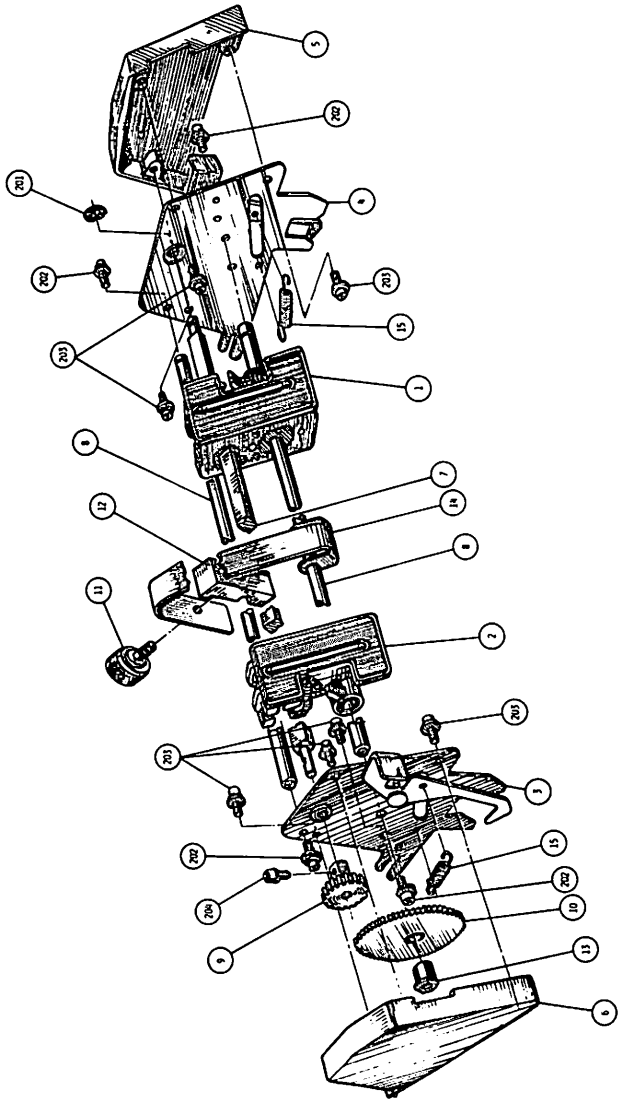


FIGURE 7-11: VERTICAL TYPE TRACTOR FEEDER

136-031597-001-A Paper Net Assembly

Item	Part Number	Description	Qty
1	136-722810-001-A	Guide Bar Assy	1
2	136-722791-A	Guide Net Bracket	2
3	136-722804-A	Support Bar	1
4	136-723968-A	Spring (Paper Net)	2
5	136-722903-A	Cushion	2
6	136-722793-A	Guide Roller	13
7	803-010030-040-0	E Ring	2
8	136-722799-A	End Detector Assy	1
9	805-300003-008-0	PL-CPIMSx3x8x15BF	2
10	805-300004-008-0	PL-CPIMSx4x8x15BF	4
11	805-330103-006-0	L-CPIMSx3x6x3GF	6
12	805-300103-008-0	PLCPIMSx3x8x3GF	2
13	136-724220-A	Lower Guide Bar Assy	1
14	136-724223-001-A	Guide Net Frame	1
15	136-724223-002-A	Guide Net Frame	1

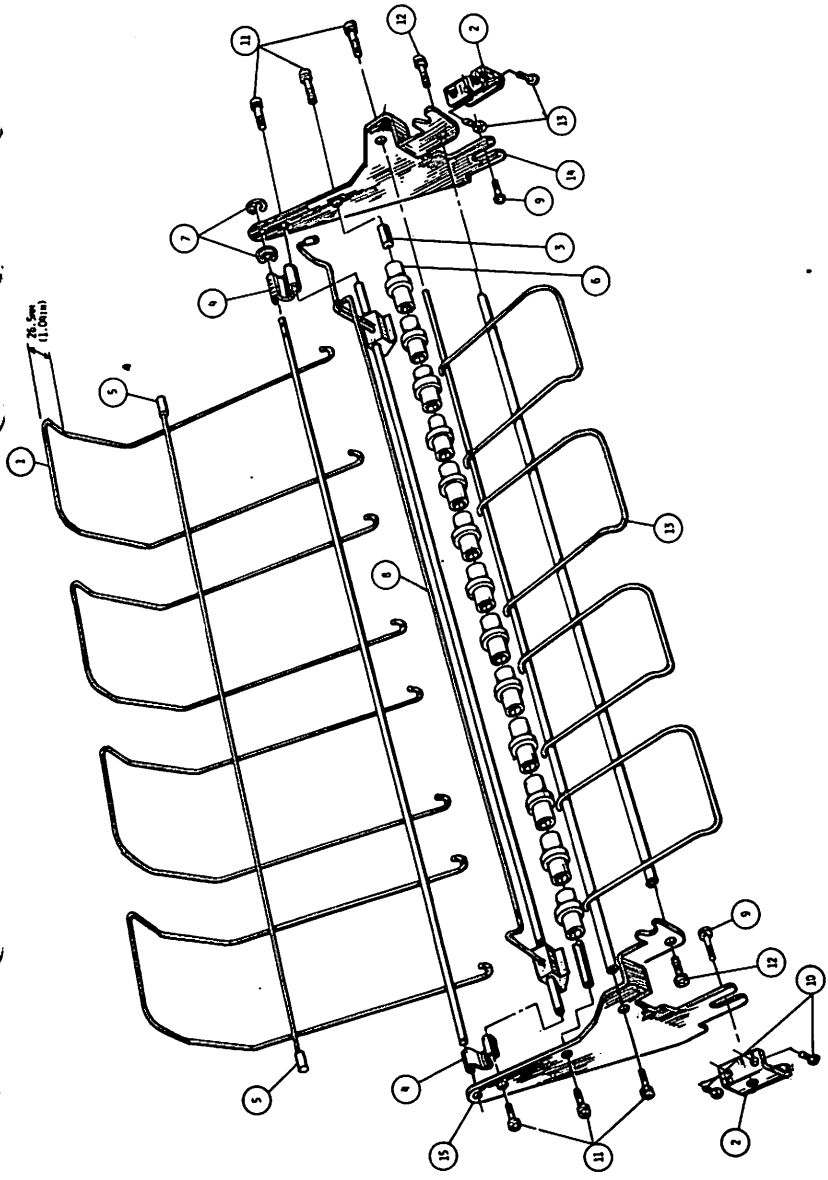


FIGURE 7-12: PAPER NET ASSEMBLY

INTRODUCTION

This section provides information on the installation and operation of the PRIMOS spooler and the Office Automation Spooler, using a printer connected to an AMLC line.

PRIMOS SPOOLER INSTALLATION

In order to use a serial line printer on an AMLC line certain requirements must be met.

1. The serial device must be on an AMLC line that is ASSIGNABLE. An ASSIGNABLE AMLC line is any available line that occurs after the terminal users, e.g. if lines 0-12 are terminal users, line 13 would be the first assignable line. The system must be notified how many AMLC lines are assignable. This is accomplished in the CONFIG file, using the NAMLC statement. The CONFIG file NAMLC statement would look like this if there was 1 assignable AMLC line: NAMLC 1 .

2. The PROP command for the device must indicate the AMLC line the device is connected to. This is accomplished using the DEVICE statement in the PROP command. If the AMLC line in question was line 13 the DEVICE statement would look like this:

   DEVICE: AMLC 13

   The PROP command should also indicate where the document is to be spooled, i.e. FORM NEC, AT NEC etc. This will allow the person who is spooling the document to specify where the document is to be printed.

4. The AMLC command in the C_PRMO file must indicate the speed and protocol the device is using. In the case of the SPINWRITER the AMLC command would look like this:

   AMLC TTY 13 2313 20000

   This command states that on line 13 there is a device running at 1200 baud, using XON/XOFF protocol. Refer to Manual 80 Appendix E for a complete breakdown of the AMLC command.

5. Due to timing considerations with the SPINWRITER the AMLBUF statement, (in the Config file) must be modified when using the SPINWRITER with the standard Spooler (NOT the OAS Spooler), at 1200 baud. The AMLBUF statement must have the DMQ size reduced to prevent a buffer overflow error condition from occuring during a carriage return or line feed. The AMLBUF statement should look like the:

   AMLBUF 200 300 16

   This problem only occurs at 1200 baud.

When the system comes up the printer will automatically be using the AMLC line. An example of how to spool a document to a SPINWRITER connected to AMLC line 13 is:

SPOOL CHAP2 -AT NEC

OAS SPOOLER INSTALLATION AND OPERATION

GENERAL INFORMATION

The OAS printer system is designed to support read/write (KSR) or Receive-Only (RO) Diablo 1600 series compatible printers such as the SPINWRITER Model 5515.

Spinwriter Model 5515

When printing using a model 5515 printer it is necessary to start and control the printer program from another keyboard terminal. The following information is necessary before operation of the printer is attempted:

1. Correct baud rate of the printer.
2. AMLC line number of the printer.
3. AMLC command configuration parameter that corresponds to the correct baud rate.
4. Queue number of the appropriate printer queue.
5. The two character paper type code that specifies the type of paper loaded in the printer.
6. The printer protocol (XON/XOFF).

Once all of the above information has been obtained, the template phantom control file CMDNCO>PH_LQPO can be edited to create the actual control file for the specific printer. An example of the PH_LQPO (phantom for letter quality printer 0) is listed below:

```
COMO O_LQPO
/* TEMPLATE FOR PRINTER PHANTOM COMMAND FILE.
/* ## IS PHYSICAL LINE NUMBER.
/* QUEUE PARAMETER IS 0-9/A-Z.
/*
ASSIGN AMLC 35 TTY 2313 20000
SEG OAS*>RUN>#LQP -LINE 35 -PAPER AA -QUEUE 0
COMINP -TTY
COMO -END
LOGOUT
```

Change the double pound signs (##) within the file to the octal AMLC line number of the printer throughout the file.

Modify C_PRMO in CMDNCO so that the AMLC lines to be used for the Letter Quality Printers (LQP's) are set to the correct baud rate as well as being NO-OPed. The correct baud rate for the printer is 1200 baud. The form of the AMLC command is:

AMLC TTYNOP ## 2313 20000
(Refer to Manual 080, Appendix E))

The double pound signs (##) are replaced with the appropriate octal line numbers. A template control file for the off-line printer control phantom is placed in CMDNCO under the name "PH_LQPO" by the OAS1 installation procedure.

A copy of this file should be made for each off-line printer phantom which will exist, with the double pound signs (##) in the template replaced by the octal line number of the AMLC line connected to the corresponding Letter Quality Printer.

Since the SPINWRITER uses XON/XOFF protocol, the "-ETX" should be removed entirely from the command line "SEO" in the file PH_LQP0. A symptom of the incorrect presence of the "-ETX" parameter is that the first four or five lines of the document index will be printed and then printing will stop completely. The phantom controlling the given printer will remain logged in. If this is the case, LOGOUT the phantom, and remove the "-ETX" from the control file. Restart the phantom and the printer should operate correctly.

Insure that the proper parameters are given in the "ASsign AMLC" command and file the edited control file under the name desired. This file is now the file which allows the printer program to run as a phantom. To invoke the phantom enter the PRIMOS level command "PH phantom-filename". The printer program normally waits for a proceed command and therefore a "GO" command must be issued. The command sequence to initiate a printer phantom is:

```
OK, PH phantom-file-name
OK, OA_PROP -# -GO
```

The OA_PROP -# -GO is issued by the operator and the pound sign (#) is replaced by the queue number (0-9) that the printer operates from. From this point, the printer may be controlled as necessary by the various OA_PROP commands.

OA_PROP Commands

The following commands can be used in controlling the printing of documents. To use these commands, enter "OA_PROP -# -command". As in all other cases the pound sign (#) should be replaced by the appropriate queue number.

-DROP stops the current document from printing and removes it from the print queue. If there is another document in the queue which can print, it will begin printing. It is recommended that the "-PAUSE" command be given before entering the "-DROP" command.

-FINISH finishes printing the document currently being printed and stops the printer program which then awaits another command. If there is another document in the queue which can print, it will not print until a "-GO" command is given.

-GO starts printing the first document in the queue.

-HELP gives available OA_PROP commands

-CANCEL n removes the specified document from the specified print queue. "n" is replaced by the queue entry number prefaced by the queue number as given by the "-LIST" command.

Example, if it is desired to remove the document corresponding to P0004 in queue number 2 the correct command would be:

```
OA_PROP -2 -CANCEL 2P0004
```

If it is desired to remove entry P0007 from queue number 1 the command would appear as:

```
OA_PROP -1 -CANCEL 1P0007
```

In both examples, the digit before the "P" is the queue number that the document appears in.

-LIST lists the documents currently in the specified queue with associated information. This information includes the number of the document in the queue, the document ID, the date and time it was placed in the queue, and the paper type

-NEXT n directs the printer to begin printing the document whose queue entry number is "n" after the currently printing document is finished. "n" is replaced by the queue entry number corresponding to the desired document (i.e., P0002, or P0007).

-QUIT stops printing of the current document in the queue but does not remove it from the queue. To verify that the user actually wishes to end the printing session, the question "DO YOU WISH TO LOGOUT THE PRINTER PROCESS ?" is asked. Responding "YES" will complete the command, while answering "NO" will cause the command to be ignored. To continue printing documents, the user must enter a "-GO" command.

-PAPER xx changes the type of paper to be used while printing documents. The paper type code is entered in place of the "xx". If a document is printing, the printer will pause, and the user must enter either a "-GO" or "-RESTART" command to resume printing.

-PAUSE stops the current document printing and waits for a "-GO" or "-RESTART" command before proceeding. "-GO" will resume printing from the point at which it was interrupted, while "-RESTART" will cause printing to begin at the start of the document. "-PAUSE" must always be followed by another command.

-RESTART stops the current document printing and begins printing the document from its beginning.

The commands "-DROP", "-FINISH", "-PAUSE", and "-RESTART" can be used only if the printer program is active (i.e. a -GO command has been issued since the program was started). "-NEXT", "-LIST", "-PAPER","-CAHCEL", and "-QUIT" may be used at any time.

#LOP Parameters

These parameters define the printer environment and are entered at program run time. Of the four parameters, only the "-ETX" is optional; all of the others must be specified. If they are not, the user will be asked by the program to enter them individually. The parameters are as follows:

-LINE n the AMLC line number of the printer. "n" is replaced by the octal line number. Line 0 indicated that printer is to be used interactively.

-QUEUE n specifies the queue number the printer is to operate from. "n" is replaced by the appropriate queue number (0-9).

-PAPER xx specifies the paper type currently in the printer. "xx" is replaced by the two character paper type code that corresponds to the form type.

-ETX indicates that the printer will use ETX/ACK protocol rather than the XON/XOFF protocol.

#

PROP